The New Book of American Ships

CAPTAIN ORTON P. JACKSON, U.S.N.
AND
COLONEL FRANK E. EVANS, U.S.M.C.

F. L. Higginson

This book was given me by the son
of Captain O. P. Jackson - 8/11/39

THE NEW BOOK
OF AMERICAN SHIPS

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THE FLEET READY FOR SHORE ACTION

THE NEW BOOK OF AMERICAN SHIPS

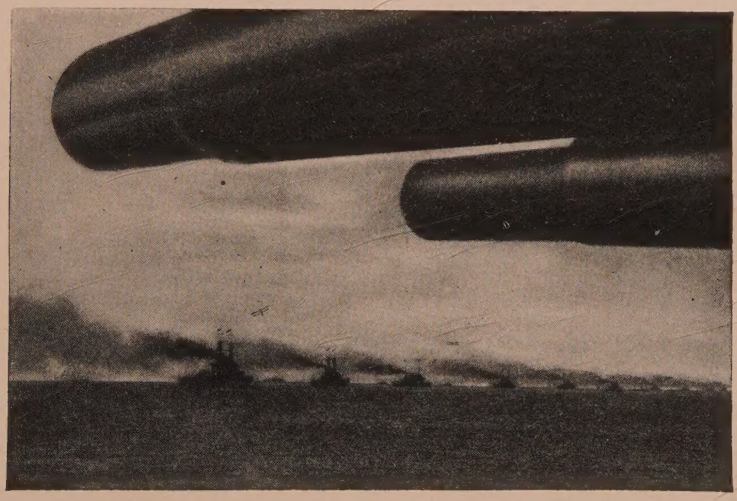
BY

CAPTAIN ORTON P. JACKSON, U. S. N.

AND

COLONEL FRANK E. EVANS, U. S. M. C.

WITH TWELVE COLORED PLATES AND FOUR HUNDRED AND SEVENTY-TWO ILLUSTRATIONS FROM PHOTOGRAPHS



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IN THE DAYS OF WOODEN SHIPS AND IRON MEN

THE NEW BOOK OF AMERICAN SHIPS

I

THE HAPPY SHIP

ON the bridge of the historic flagship of Admiral David Farragut, the frigate *Hartford,* was carved in huge letters the motto "A Happy Ship is an Efficient One." That is the aim of the American Navy to-day, and that is the reason why the American bluejacket is the best fed, the best uniformed, and the most contented of all the sailormen afloat on the Seven Seas. To cruise the salt seas,

Courtesy of "National Review"

SCRUB AND WASH CLOTHES

drop anchor now and then in a foreign port, and sandwich in between the rivalry of drills ashore and afloat the contests of water and field sports is in itself attractive enough to lure the American boy to the naval service of his country. To know a year ahead where each ship will be, to make the cruises to foreign lands more frequent, and to enlarge the opportunities of the enlisted men of our Navy in both study and recreation is the aim of the Navy Department in peace times.

The man-o'-war's-man in our Navy begins his day with the bugles sounding reveille at 5:30 in the morning, backed up by the shrill pipes of the bosun's mates and their hoarse shouts of: "Up all hammocks! Lash and carry!" Hammocks are lashed and stowed away in the hammock nettings and then coffee and ship's bread are served. In the old days hardtack was served, but to-day the American bluejacket has his bread baked fresh daily.

Then comes the call of "Scrub and wash clothes!" Kidnap a bluejacket and carry him in an aeroplane to the top of Pike's Peak, and in ten minutes his pipe will be going and from some

THE FORECASTLE WASH LINE

queer hiding-place he will produce a bucket, soap, brush and water, and a line of wash clothes will flutter in the breeze.

Until the bugles blow their welcome call of "Soupy—soupy—soupy—without a single bean!" at 7:30 the ship is running in water ankle-deep from the hoses. Wherever you turn, bluejackets and marines are cleaning decks and paint-work, scrubbing gratings and boat-gear, polishing bright-work, as the sailors call the brass fittings, and swapping yarns.

Photo by Paul Thompson, N. Y.

A LOVE LETTER AND A DITTY-BOX

After breakfast the "smoking lamp" is lighted and with it goes permission to smoke. Until the morning drill period sounds at 9:30 the men are getting into the uniform prescribed for the day, attending the call to sick bay if they are in need of medical attendance, and stowing away their sea-bags and ditty-boxes. If you are allowed a peep into the small, square ditty-boxes you will see sewing material, writing paper, souvenirs of cruises and the pictures of many girls; for the sailor of to-day, like those who have gone before, has his "sweetheart in every port." Take a sea-bag off its rail and inside you will find every article of a bluejacket's wardrobe. Each piece is neatly rolled and "stopped" at the ends

SIDE CLEANERS AT WORK

THE SHIP'S TAILOR

of the roll—tied with white cord to keep it from unrolling—and the sailor's name is stenciled in white letters on his blue uniforms, and in black on his white suits and underwear.

When the call sounds to "quarters" the crew falls in, each man in his division, in double ranks that face each other. The divisional officers walk up and down between the ranks, and woe to the man who is not cleanly shaven, whose uniform lacks a button, or whose shoes have not been shined! These inspections every day are the secret of the natty, well-uniformed sailors and marines you see on shore in uniform.

After the inspection the men extend their intervals between files and go through the Swedish physical drill, ending with double time about the decks while the ship's band plays a lively air. At the close of the physical drill comes the first regular drill for the day. Some of these drills grow monotonous but most of them are picturesque and blood-stirring.

In the big turrets and at the rapid-fire guns the crews go through the drill

READY FOR FEAST, FIGHT OR FROLIC

FLEMISHING DOWN THE BOAT FALLS REQUIRES AN EXPERT HAND

that fits them for rapid and accurate handling of their guns in battle. On the forecastle deck another division is having its infantry drill, and this often goes on while the ship is rolling and pitching to the seas.

Then there are drills, carried out to the smallest detail, for fire, collision at sea or port, general quarters for going into action, abandon ship, and the night torpedo defense drills.

When a man goes on board ship he is given a number which shows his division, his gun, his mess, hammock, sea-bag, rifle, cleaning station and where he is to go in each of these general drills. Sometimes the call to general quarters or fire drill comes at night with the gongs ringing and bugles blowing to awake the men from sound sleep.

When the drill is for collision, fire, or abandon ship, the marines race to the boats with bayonets fixed, with orders to allow no man in the boats until the captain himself passes the word. Many watertight doors are closed by electricity, and if the crew gets orders to abandon ship each man can be over the side and at his proper seat in one of the boats in a very few minutes.

THE SAILORS' GAME OF ACEY-DUCEY

When the drill is "general quarters" the crews rush to their guns, and up from below comes the ammunition by electric hoists. Down in the battle dressing-station the surgeon and the hospital attendants are ready, the ship's band is split up at various stations, and each of the thousand officers and men knows exactly where his station is and what to do. Meantime the captain, watch in hand, receives reports from all parts of the ship; and it goes hard with officer or man who is not reported ready after a few minutes have passed!

Then again it may be signal drill. The men in our Navy talk in many ways unknown to the landsman. Varicolored flags spell messages to them by day, and at night the red and white lights of the Ardois system wink news from ship to ship. Then there are the wigwag flags and the blinker system at the signal yard-arms.

In port every opportunity is taken to land the crew for infantry and artillery drill, or for a long practice march into the country, and the small boats of the fleet go through their drills under sail and under oars.

The hour of noon, when "the sun crosses the yard-arm," is a welcome event. A red pennant slides up to the foretruck and the crew goes to dinner.

CHOOSE YOUR PARTNERS

THE HAPPY HOUR ON A BATTLESHIP

A READING ROOM ON THE BERTH DECK

After dinner comes a recreation period for games, letter writing and smoking, and the band plays for dancing, etc.

The afternoon drill may be in seamanship, gunnery, signaling, or ship's work, and at eight bells—4 o'clock—comes the welcome call, "Knock off all work!" Come about the ship now and on the boatdeck you will find husky bluejackets swinging together at pulley weights until the 50-pound weights fairly sing. They are training for a race cutter crew. Duck down the nearest ladder and you see a big sailorman bent over a tiny sewing-machine. Beside him is another man on all fours bent seriously over a strip of blue cloth and laboriously cutting out the pattern for a pair of trousers for his mate at the machine. Other groups are reading or writing, working over their correspondence-school courses in electricity or mechanical engineering, and two healthy-skinned boys are boxing. Take a turn across the forecastle and you come across a number of powerful, beautifully muscled men fast asleep on black strips of canvas that are known as "caulking mats." When a sailorman wants to sleep he is apt to say, "Time to caulk off!" They are the men from the engine-room below, the giants of the ship's company, and he is a rash man who disturbs their slumbers.

Photo by H. Tolderlund

ROPE YARN SUNDAY

After the mess-call for supper comes what the crew calls "The Happy Hour." There are moving-picture shows, concerts, dancing to the music of the band, and a great deal of ship-visiting. The call to "Sling hammocks!" announces the end of "The Happy Hour," and taps at 9 o'clock ends the day aboard a battleship.

Each Wednesday afternoon is given to sewing and the washing of outfits. The crew knows Wednesday afternoon by the curious title of "Rope Yarn Sunday."

The formal inspection of the entire ship and every man in it is held on Saturday, when the Old Man, as the Captain is affectionately

TAPS ON A HAPPY SHIP

known, moves from deck to deck. He wears white gloves on this occasion, and it is not well for the peace of the ship if those white gloves are soiled by any gear or fitting aboard his ship.

Naturally, with this busy day of drills and recreations, and the tang of salt air, the appetite of a battleship's crew is a hearty one. The paymaster of the ship has charge of this department, with a large force of stewards, cooks, and messmen under him. For the officers the mess attendants are Filipino boys. Nowadays on ships like the dreadnought *Nevada* the cook of the ship, always an important and well-paid post, is a trained electrician. Every bit of work in the *Nevada's* galley is done by electricity. The cook turns a switch and the appetizing meats, the potatoes that are pealed by electricity, the soups and the vegetables along the line of electric ovens begin to steam and sizzle. Electric hoists carry the pans and pots with their steaming foods to the decks below, and the cleaning and scouring of the ironware dishes is done by an electric dishwasher.

Uncle Sam feeds his men from the pick of the market because his paymasters, buying daily for so many men, get the best at wholesale prices. The mess tables, scrubbed until they are white, are slung in racks above the deck, and the meals are served, and all signs of them

removed, in shipshape manner. Because every bit of space aboard ship is precious each man has his mess-table, hammock, sea-bag, and his gun all in the same casemate.

To help out the sweet tooth of the crew, which is a big one, the paymaster also carries a large stock of candy and other tidbits, which are sold at low prices. And twice a week, whether in port or at sea, he serves chicken and ice-cream to his big family.

The days of hardtack and of the old "shellback" sailorman are gone. The modern sailorman can no longer "pass the weather earring," but he is handier, better cared for, and a more useful man to his country than the old tar.

A SUBMARINE AT REST

II

OUR UNDERSEA FIGHTERS

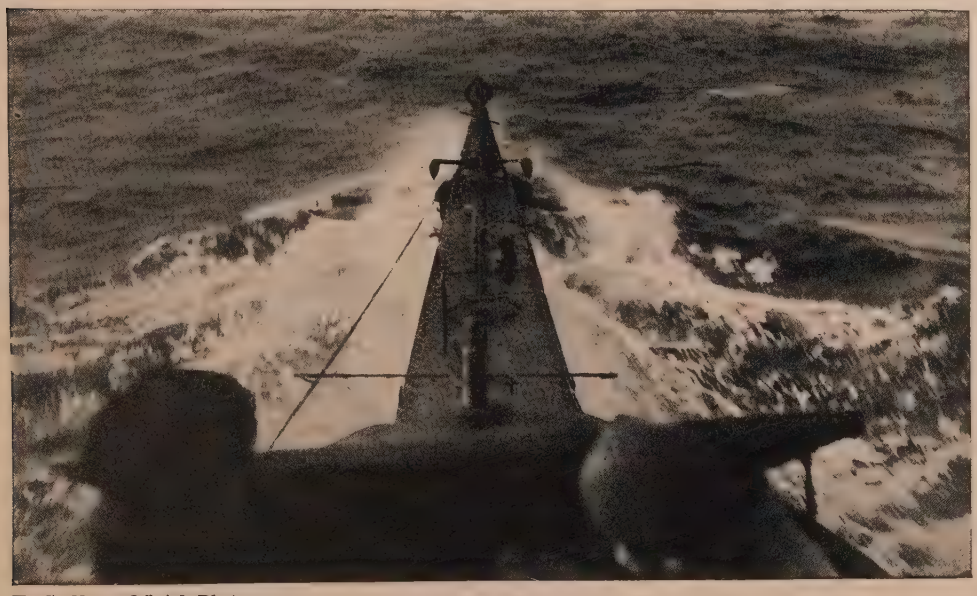
OF all the craft that make up the Fleet, from the grim dreadnought and its powerful sixteen-inch monsters to the fussy steam-launch and its one-pounder gun in the bow, there is none that should have the same interest for the American boy as the submarine. Of all the units of the Fleet it is the one distinctively American product of inventive genius. It was an American, Robert Fulton, then living in France, in 1800, who designed the first submarine. It was another American citizen, John P. Holland, who built the first submarine that met its tests successfully, and which carried within its steel skin practically all of the principles of the modern submarine.

As far back as the sixteenth century men dreamed of a boat that could travel beneath the seas, just as men dreamed of a craft that could sail through the skies with the freedom of a great bird. Not until the two Americans, Fulton and Holland, made their practical contributions to this end did the submarine of to-day emerge from the realms of visions to its grim power. Jules Verne, in his remarkable romance, *Twenty Thousand Leagues Under the Sea,* only sketched the wonderful possibilities of the craft that he dreamed of.

Of all ships, the submarine is the only one that can maneuver beneath the waves as well as on the surface, and the dreadnought of 32,600 tons is an easy victim to the submarine of one-fiftieth her tonnage when the submarine takes her unawares.

THE "HOLLAND," DADDY OF ALL SUBMARINES, DOCKING WITH RUSSIAN CRUISER "RETVIZAN"

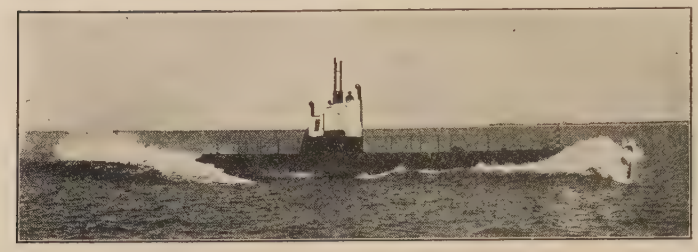
It remained for the World War, more than a century after Fulton's design, to vindicate the prophecies that the submarine would play a great part in the struggle for the control of the seas. The war stripped the submarine of much of its mystery, for every American boy now knows something of the part it plays in naval warfare, of how it fights and how, in turn, it is hunted to be either captured or sunk. It must be a matter of national pride that Americans gave to that war one of its mightiest engines. American-built submarines, too, showed to the world that the tiny undersea craft, assembled in this country, were heard from in the fighting at the Dardanelles, having traveled five thousand sea leagues away.



U. S. Navy Official Photo

THE KNIFE-LIKE BOW OF THE SUBMARINE

Ever since the United States Government accepted the first successful submarine, the *Holland,* in 1898, all navies of the world have built, and are building, fleets of submarines. They have increased in size, power, and seagoing abilities until Germany produced the super-submarine, the *Deutschland,* with its displacement of 2,300 tons submerged, in the summer of 1916. The *Deutschland* was the first demonstration of the part that the big undersea craft are destined to play in the development of commerce as well as its destruction. Unarmed, she ran the formidable British blockade from Bremen to Baltimore and back, her hull loaded with priceless contraband, and returned, making Bridgeport, Connecticut, on the second trip.



FULL SURFACE SPEED

The ordinary type of submarine used by the United States Navy had about 500 tons of submerged displacement, much smaller than the seagoing submarines used by the European nations in their raids on commerce and in their blockades. It was left to them to prove that the submarine was even a more formidable weapon, in some respects, than those who knew it best under peace conditions had claimed. There had been practically no chance to test out its efficiency except under peace conditions. Naval officers not only had had no practical opportunity to prove out their theories of attack, but there had been no practical chance to build up a defense against the untried weapon.

Like the torpedo, without the use of which the undersea boat would have remained little better than a toy, the submarine is so shaped. In reality it is a submerging or diving torpedo-boat, driven on the surface by oil engines, below the sea by electric power, and discharges torpedoes at its enemy.

The torpedo tubes of a submarine vary in number according to the size of the boat. Some types carry their tubes aft, some on the broadside, but the majority carry them forward. The torpedoes used are smaller than those fired from destroyers and from battleships. The torpedo itself is astonishingly accurate because of the gyroscopic mechanism which, acting on a vertical rudder, holds it true to its course. The

SURFACE CONDITIONS

difficulty in aiming the torpedo in submarine work is great and this alone has saved many ships from destruction.

Because the submarine does the greater part of its deadly work while partially or totally submerged, and because its only protection against an enemy ship lies in diving, it is built to meet the great pressure on its hull. Unlike other craft it is therefore usually built in circular sections, because this form gives it the strength needed.

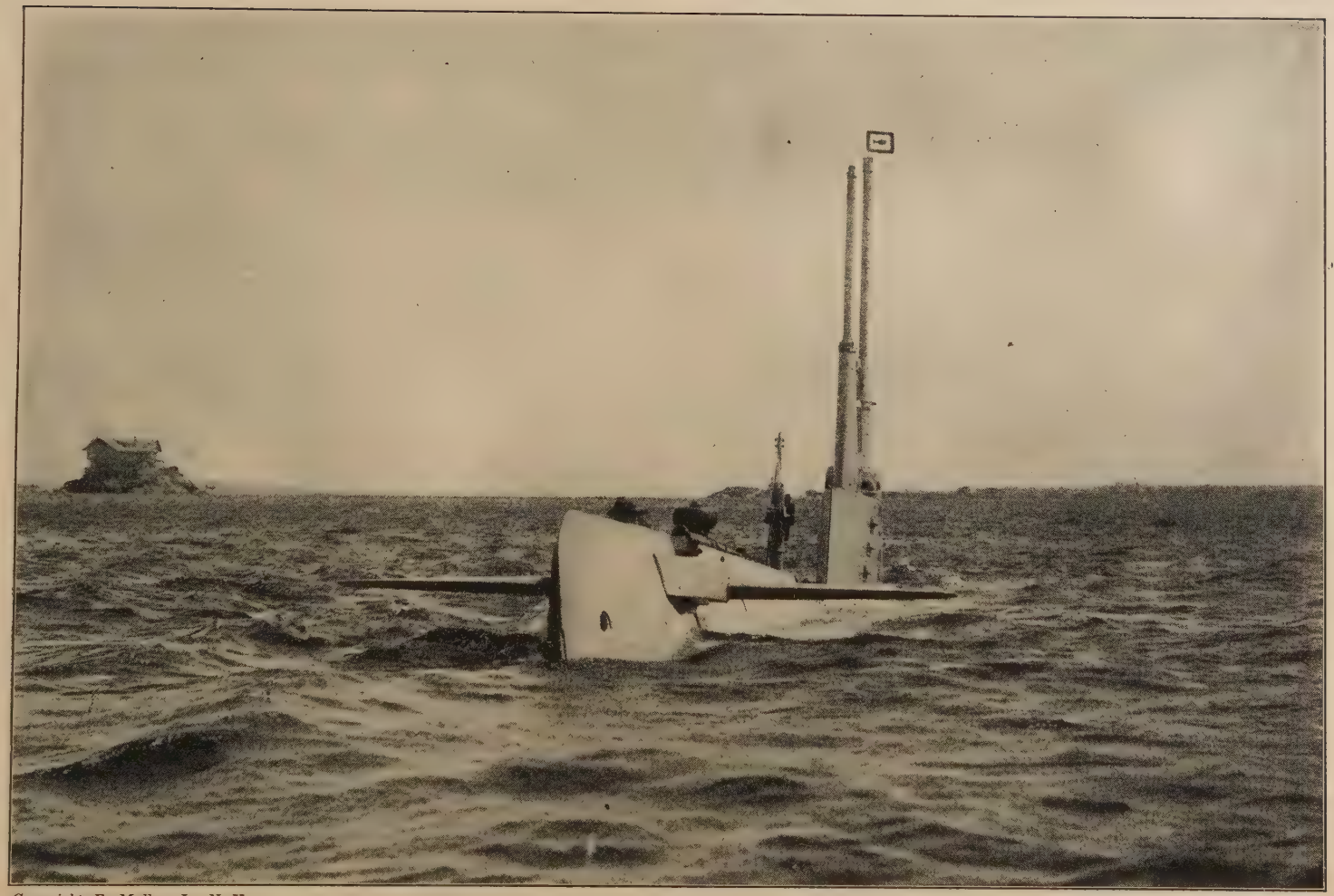
IN DIVING TRIM

When the submarine runs on the surface it is driven by oil engines with a speed which ranges around 21 knots. When the "sub," as its crew calls it, dives and runs submerged, it is propelled by electric motors which are fed by storage batteries. At target practice they run submerged at about 8 knots, and one improvement for which all navies are striving is to increase this speed below water.

The new submarines that have been built for our Navy will average about 2,000 tons displacement when submerged, be about 335 feet long and will have a speed on the surface of about 19 knots, and a maximum speed below of nearly 14 knots. The "subs" of this type will cost $1,200,000 without figuring on the armor and the armament. To build them longer would increase the danger in diving, but they will be as seaworthy, speedy, powerful, and comfortable as any submarine afloat.

RUNNING AWASH

At one stage of the submarine's development carbonic acid gas was a danger to which the crew was ex-



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SUBMARINE COMING UP AFTER 18-HOUR DIVE. NOTE HER BOW RUDDERS AND WARNING FLAG

posed and it was customary to carry white mice as pets on the "subs," for they quickly collapsed at the first trace of it. Now mechanical devices show the formation of any gas, such as hydrogen, which is odorless. As the current developed while running submerged is quickly used up at high speed, the undersea fighter usually runs at slow speed, using the high speed only for short spurts. The current can only be replaced by coming to the surface, operating the oil engines, and recharging the batteries; so that the maximum speed can only be made while on the surface.

Like the torpedoes that have made the submarine the most dreaded of all sea fighters, the modern submarine is divided into watertight

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THIS BRITISH SUBMARINE, LARGE AS A CRUSIER, CARRIES GUNS IN HER TURRET

compartments. These are the torpedo, crew, battery, diving, and engine compartments; spare torpedoes are carried in the crew quarters.

Life on a submarine is no bed of roses, but the Navy never lacks for volunteers for the flotilla. It carries extra pay to make up in part for its discomforts, but more than all the lure of danger attracts the American bluejacket.

The living quarters, built for crews ranging from ten to thirty men, are damp, cramped, and the air is usually foul with oily vapors and stale air. At best the amount of fresh air in a submarine is one-third that which a man enjoys on a surface-operating ship. In rough weather, whether running above or below water, the percentage of seasickness is high even with men who never have felt its pangs on board a battleship in the worst of storms. On the surface, in nasty weather, everything is closed but the conning tower hatch and then

conditions within the "sub" are almost as bad as when running submerged.

In the regular channels it is hard to sink to a depth that will bring any relief, but out in the open sea, when a gale rages, she can sink to a depth of one hundred feet. Even then there is an up and down motion, which the crew calls "pumping," that cannot be escaped.

It is only on cruises of a fortnight or so, however, that a submarine crew gets no relief from these conditions. Between runs, and while in port or at the submarine base, the crews live in airy barracks or sling their hammocks in tenders that are detailed with each flotilla as a mother ship.

Little shows above the deck of the submarine on the surface but the conning tower, which stands about six feet above deck. The surface navigation is done exactly as with other vessels, the captain and helmsman using the conning tower for their station. Below the water the periscope takes the place of the conning tower. A rapid-fire gun, running in caliber up to one that fires a fifty-pound shell, and the radio for signaling purposes, are housed in the superstructure or recessed in the hull when the submarine makes its dive. The gun is used both for halting merchantmen that try to escape and in blockade duties. A submarine bell for use while submerged has been added to the modern submarine's signal equipment; and another great improvement is the use of electric stoves for cooking, the current being taken from the storage batteries.

When the submarine finds it necessary to submerge preparatory to an attack, to escape an enemy ship, or for practice, all openings in the hull are closed by watertight hatches. The Holland type has diving rudders, and the Lake boat—our two leading types—flat projecting fins forward and aft, called hydroplanes, and both sink nearly on an even keel. Water is then admitted to destroy the natural buoyancy of the craft, by way of the ballast tanks. The diving rudders, forward at the bow, and aft at the stern, are deflected, and the water closes over the sea tiger, leaving but a few bubbles to mark its going.

A gauge registers the depth to which she sinks. The greatest depth at which she operates is ordinarily eighty feet, but submarines have operated as far down as from two hundred to two hundred and fifty feet. Here the pressure of the water is so powerful that there is danger of crushing the sides and being unable to rise to safety. To test the strength of a new submarine's hull they must submerge to two hundred feet, if they are of the large type, as this has been found to leave the right margin of safety.

Courtesy of the "Scientific American," Copyright by Munn & Co., Inc.

SHIPS THAT FIGHT ABOVE, UPON, AND BENEATH THE WAVES

When running submerged the swish of a ship's propellers in the vicinity can be heard inside the submarine; and when the captain is thus warned of the enemy's presence he can rest in peace on a clean bed of sand while the submarine hunters cruise vainly above.

Without the periscope the submarine would be a blinded fighter. Its most deadly work is done at a submerged distance which shows but a foot or two of the periscope's tip. The periscope is a long vertical tube of small diameter, with prisms at either end and the necessary lenses. Eighteen feet above the deck it runs; and below, where the other end pierces the hull, is the eyepiece for the observer.

A MODERN AMERICAN SUBMARINE

It can be turned in any direction, and when an enemy ship, or a merchantman trying to run the blockade, comes within its field, the submarine is suddenly transformed into a formidable and stealthy sea tiger. The periscope becomes its eyes, and the dials, compasses, and other instruments of the fire-control its brain. The engines that carry it to effective range are its swift, tireless legs, and the destructive charge of 400 pounds of deadly TNT in the unleashed torpedo the death-dealing jaws and rending claws of the great cat that has seen its prey and steals up on it with the skill of a tiger stalking a buffalo.

The submarine chooses to fight at as close quarters as can be had with safety, to cut down the chance of missing its big quarry, and because an unlimited supply of the $5,000 torpedoes cannot be carried. As soon as its target is discovered—it may be miles distant—the captain takes his bearings and down goes the "sub" and with it the telltale

periscope that, once seen, draws a shower of shells which would crush its skin as though it were but an eggshell. Then he dives and steers by his bearings to a range as close as is wise. Up goes the periscope for a final aim, just high enough to make it certain, and the submarine swings about to bring its torpedo tubes in line with the target. In the time that the torpedo covers a thousand yards a dreadnought will steam twice her length; and this, and the conditions of the weather, must be quickly

A SUBMARINE AS SEEN FROM A SEAPLANE

and accurately considered by the "sub's" skipper. The war has shown that when a submarine is discovered the only safety for a vessel is to steer a zigzag course and crowd on enough steam to let the torpedo go tearing by. The slightest error in aim is fatal to a submarine's chances of a telling hit.

When the exact position is determined comes the word: "Stand by to fire a torpedo! . . . Fire!" Straight as an arrow speeds the cigar-shaped missile and its deadly gun-cotton, traveling ten to fifteen feet below water to make its hit beneath the vulnerable waterline of its target. The compressed air that is its motive power shows in the torpedo's wake in a sinister track of light air-bubbles. The impact

of the torpedo's head on the hull of the luckless ship explodes the shattering charge of TNT and this first explosion is felt slightly within the hull of the waiting submarine. Often there is a second explosion if the torpedo finds the ship's boilers or her powder magazines.

Then the diving rudders are reversed, the ballast tanks pumped out by compressed air, and the long, shark-like body creeps warily to

A SUB WITH ITS SCOUT PLANE

the surface for a "look see," as the sailors have it. The critical moment, whenever a "sub" rises, begins when the periscope has climbed to a point where it reaches the depth of a ship's keel. It ends only after the periscope's tip shakes off the water and the captain can sweep the surface with its aid. All this time his craft is like a great, blinded fish, helpless against attack. As the tip clears the surface the dark shade of the sea fades to the grass green of the undersurface, and then white air-bubbles can be seen as the silver touch of daylight signals the return to the surface.

With the nerves of the crew at high tension, iron men though they are, comes the search for the enemy. A seething white cloud of steam pouring from the open hatches and ports of the crippled vessel tells its tale. A few minutes later there is nothing but a huddle of wreckage to show where the submarine has added another to its grewsome toll.

Just as the World War brought the possibilities of the submarine to a skill never dreamed of, so has it brought to the front the methods of hunting down and destroying or capturing it. On blockade duty trawlers, towing between them grappling lines, sweep suspected

areas for them. To protect the clumsy trawlers torpedo craft patrol outside with unceasing vigil and tow explosive-laden sweeps behind them. At other points where submarines have been reported are stretched stationary nets with mines above. The explosive sweeps and the mines, when detonated by the touch of the submarine, explode with deadly effect.

Many submarines in the course of the war were caught in nets of wire. Their propellers fouled in the meshes, and as the submarines were closed tight against the water, it was impossible for them to cut the net away. When trapped in this manner their fate was sealed.

THE PATH OF THE TORPEDO

The initial air carried inside a submarine lasts but little more than half a day. Then air had to be used from the air flasks or "banks" and the foul air could not be pumped out, as then would come a vacuum in which the crew could not live. Three days or possibly four and the trapped sea tiger held only a dead crew.

Seaplanes, when the sea is calm, the bottom light in color, and the air conditions good, can spot and follow submarines when they are within fifty feet of the surface.

It calls for men of iron nerves and quick decision to man our submarines either in peace or in war. Submarine experts look upon the factor of nerves as the most important of all, and they have given to it the title of *calculation.* Within the cramped walls that are the home of the crew are housed the most intricate mechanisms that man has invented for warfare. Outside its steel walls are mines, great nets of wire, explosives, shells, and seaplanes, all devised for its destruction, and the sharp keels of ships that slice through a submarine as a knife cuts cheese. The smallest shell can penetrate the steel skin, and nets

can hold the submarine as helpless as a child in the grasp of a giant. Danger lies everywhere for the tiger of the seas. The ocean in which it lives is a powder tank that needs but a spark. Only nerves of iron can cope against such an array of enemies. The slightest hesitation of its captain in the face of any one of them means the end of his ship and his crew. As one expert has put it, the whole A B C of submarine warfare is the ability to meet any situation at an instant's warning and then to act with nerves of steel.

In the World War the maximum use was made of the submarine's most deadly characteristic, surprise attack. Its radius of action was increased, the newest listening gear installed, better gunfire provided, and the reliability and safety of its operation improved. Mine-laying submarines were developed and fleet submarines, with speed enough to accompany the Fleet on its operations, were provided with a scouting seaplane.

The effectiveness of the submarine depends on its ability to evade detection and counter-attack while it is delivering its surprise attack. Since the war the defensive measures against a submarine attack have improved so rapidly that the results it achieved in the early part of the war are now impossible.

The modern submarine is a valuable arm to assist the Fleet in winning and holding control of the sea in a fleet action, and its coast defense strength. The next great sea battle will call for mine-laying operations by the submarines as well as their attacks on the enemy battle line, and the Navy has provided for this contingency.

THE FLEET SUBMARINE KEEPS THE SEA WITH THE BATTLE FLEET

LAYING A BATTLESHIP'S KEEL AT THE FORE RIVER SHIPYARDS

III

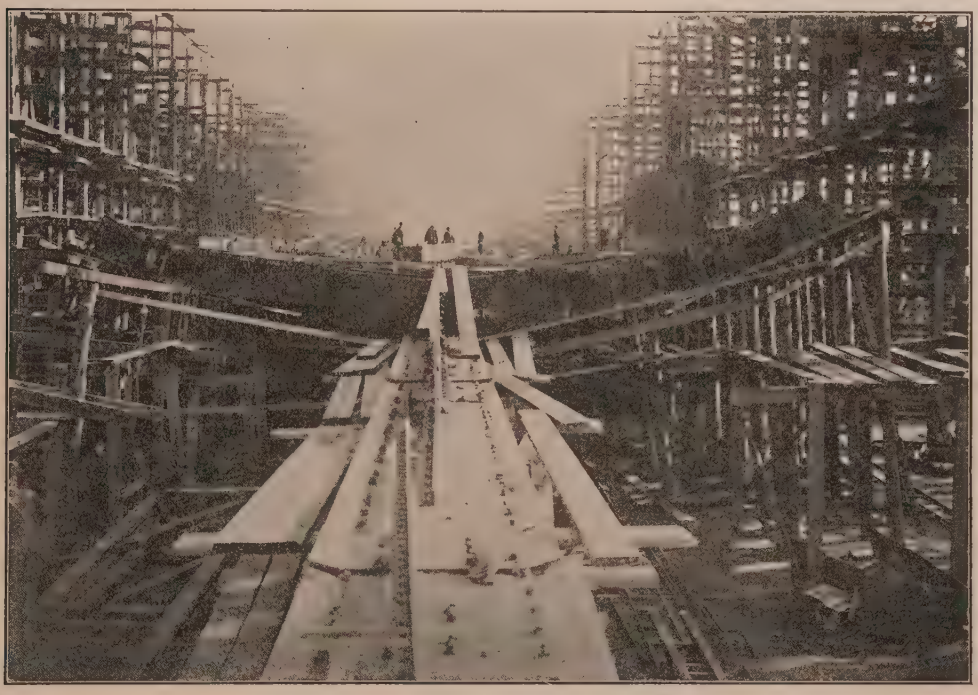
THE BIRTH OF A SUPERDREADNOUGHT

FROM the first step in the conception of a mighty superdreadnought until her captain's pennant flies over her, the chapters of her life are screened from public view except for the picturesque ceremonies of the laying of her keel and her launching. Only the privileged few are allowed fleeting glimpses behind the screen that prudence, and military necessity, rear about the new fighting monster.

The finished fighter is not the work of any one man, or any one ship-building yard. Down in the offices of the General Board of the Navy Department at Washington, over which the hero of the Battle of Manila Bay, Admiral George Dewey, ruled, its birth begins. The recommendations of these expert advisers guide the Secretary of the Navy in his dealings with the Naval Committees of Congress when they meet to draw up the building program for the American Navy.

When the Naval Appropriation Bill has run the gauntlet of Congress, and the pen of the President has made it law, the chiefs of the various bureaus of the Navy Department are ready with their plans and their specifications. On these the navy-yards and private ship-building yards make up their estimates of time and cost.

The ship-builder has not been idle. The plans still require that he, through his corps of crack draftsmen, must submit estimates or bids that require the outlay of many thousands of dollars. All these



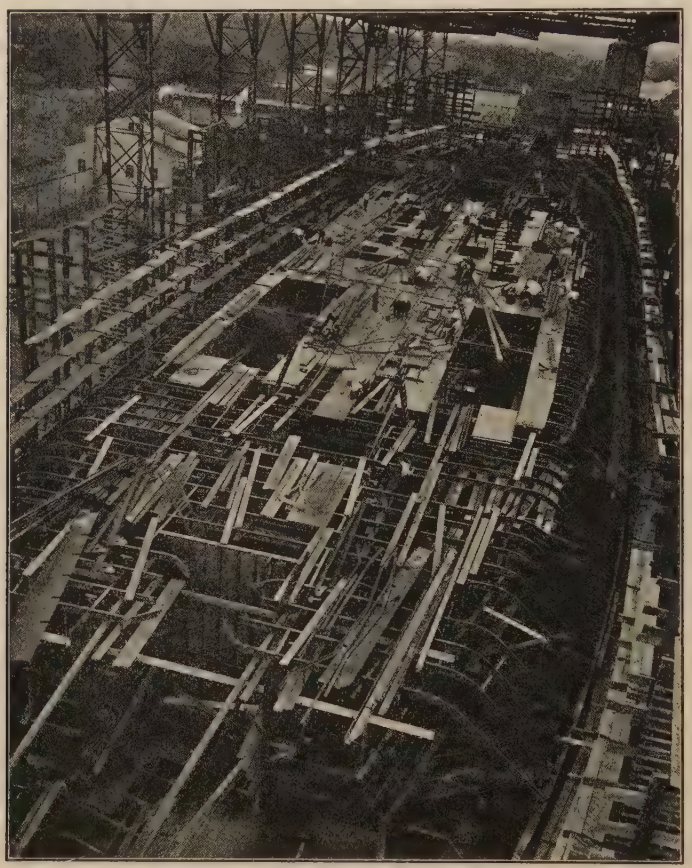
THEN COMES THE TRANSVERSE FRAMING

finished estimates are sent to the Navy Department in sealed envelopes, opened on a certain day, and the awards for construction of the new ships are placed. Not a moment's time passes before the lucky bidder puts his force to work at maximum capacity to make detail drawings for the work. Orders for his steel and other material are rushed through with the same celerity.

The keel is the first part of the superdreadnought to be laid down. Even while its drawing and its material are under way the shipwrights work at top speed preparing the blocking on which the keel-plates are to be laid. On the floor of the mold loft of one of the largest buildings in the shipyard is begun another highly important

work. The plan of the shape of the new fighter, known as the "lines," is here enlarged to actual size. The shape of each transverse frame, which in your rowboat you call a rib, is shown on this floor, and then a "template," or wooden form, is made to fit the "frame."

These are rushed over to the bending "slab," where the steel frames are heated red-hot in the furnace and bent to the shape of the "template." Similar plans are followed in shaping the bulkheads and decks. As each part of this work is finished the ship-fitters begin their noisy chorus, punching holes in the structural steel, and it is then ready to be bolted up in its proper place on the ship's skeleton and riveted on. The transverse frames are joined to the long stretch of keel, and the ship-builder bends his energies on the array of transverse and longitudinal bulkheads that divide the sea-fighter below the water line into hundreds of rooms so skillfully fitted that they are watertight compartments. Should a shell, a torpedo or mine pierce one of these compartments, the other bulkheads confine the damage to a small space and our sea-fighter can still deliver her mighty blows.



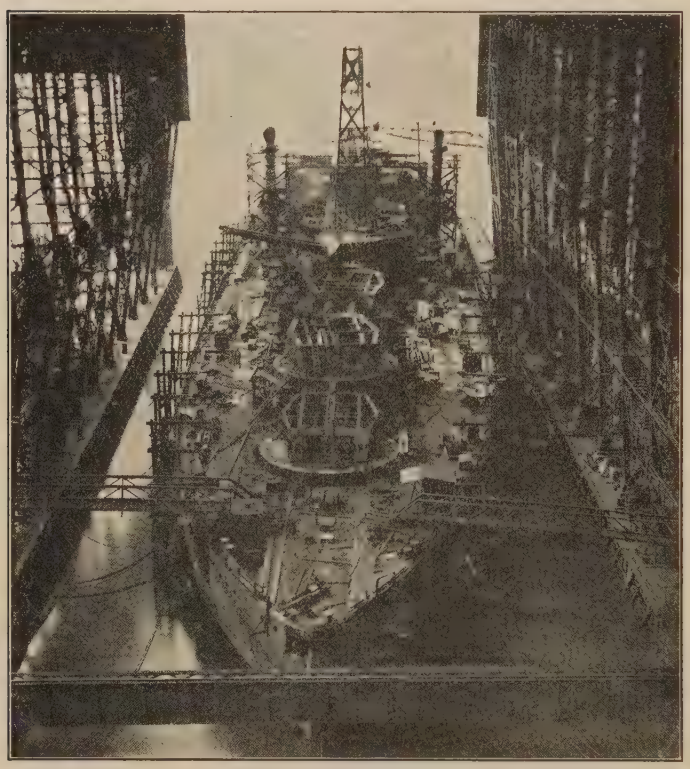
THE PROTECTIVE DECK IS CURVED AS GREATER PROTECTION AGAINST SHELL FIRE

This work below the water line shelters the very vitals of the great machine: the machinery and the magazines; and above them all the craftsmen of the shipyard build the heavy steel deck so aptly called

THE MAIN AND UPPER DECKS RISE

the protective deck. The sides of this guardian shield of steel slope down so that an enemy's shell loses the deadly advantage of a direct hit, and deals but a glancing blow.

Above this structure is built the main deck and the upper deck, with heavy plating that protects the ship from falling shells and from aerial attacks. Along their length gape openings where the mighty turrets, the stacks, and the masts are to be located. The big ship is now well advanced and every department of the shipyard is racing to guarantee its completion within the contract time. The pattern makers are shaping their patterns for castings, which the foundries mold in iron, steel, and brass. The machine shop is turning out its products, and the copper and pipe shops are as busy as beavers installing pipes for drainage and fire mains and pumping and steam pipes. When the ship at last is ready for her place in the fighting line her network of pipes can easily be traced, and their functions seen at a glance, for each carries its own distinctive band of color.

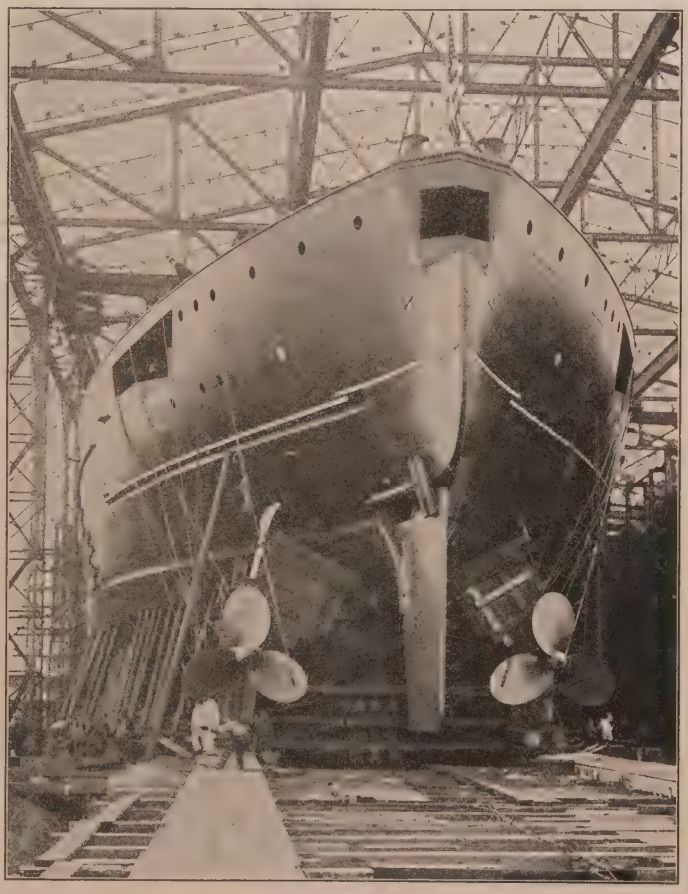


THE TURRETS REAR THEIR STEEL HEADS

Over in the blacksmith shop small forgings are being turned out, and the electricians are running their miles of wiring. Teakwood backing is being put on the armor, and the sheet-metal shops are busy with the ventilation piping and metal furniture, for the modern fighter has little use for wood with its risk of fire or splinters. The paint shop sends its swarm of men to put on the first coat of red lead; and

all through the yard, with its mass of shops and thousand workers, the great job moves on with beautiful teamwork, despite the apparent confusion that bewilders the layman.

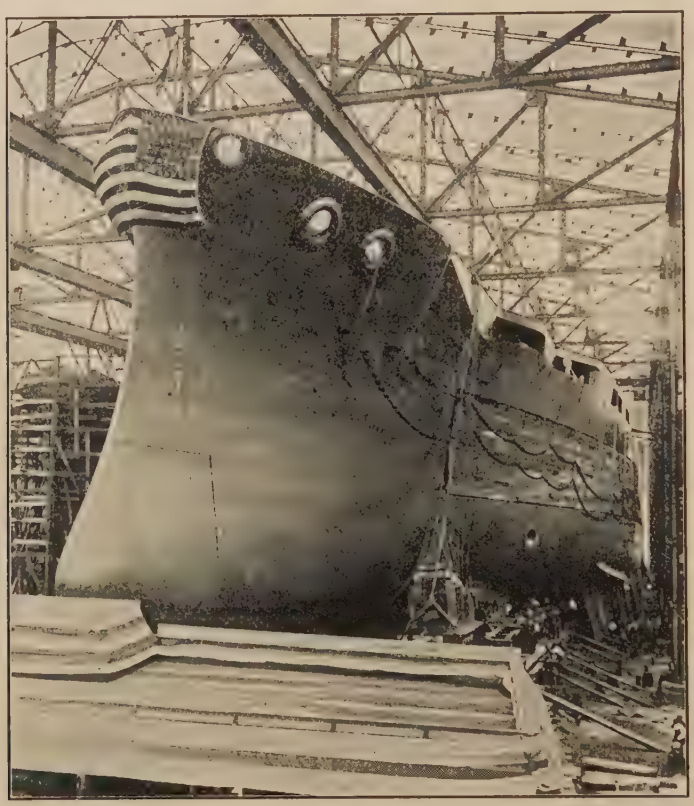
Outside the limits of the shipyard a corps of specialists are doing their part. Some furnish the steel plates and others the hoisting machinery for the giant anchor chains. Electrical manufacturers supply motors and dynamos, and still others the electric fans which draw in great draughts of fresh air for ventilation, laundry machinery, electric bake-ovens, and all the wealth of electrical wonders that are housed in the finished ship. And following up each detail of the work comes a corps of inspectors who rigidly inspect and then test every foot and piece of it all.



THE STERN VIEW WHEN READY FOR LAUNCHING

The ship can now be likened to a great hotel with stories ten feet high. It has three cellars of this depth below its ground floor. Above that comes the floor that is level with the bridge; and so it goes, to a total height of eleven such floors; to a point just below the circular platforms of the fighting masts, where the "spotters" are stationed in action to observe the splash of her shells and correct the range. The electric plant is powerful enough to supply ten 40-watt lamps to each of the crew of 1,400, and the bakery, galley and kitchen sufficient to feed them.

The ship carries her own blacksmith shop, coppersmith shop and machine shop. One floor has its "sick bay," as the hospital is called, with twelve beds, an operating room and an isolation ward. All of these and many other facilities beyond the instruments with which she fights are found in the modern superdreadnought. Should a



THE BOW CHAINS ARE RELEASED WHEN SHE TAKES THE WATER

mighty tidal wave lift her unharmed on to a desert island she would be a city in herself.

The months mount up to twenty from the laying of the keel, and the big fighter, minus her guns, turrets, and part of her armor, is ready to slide into the water that has been waiting patiently for her child. These would add too much weight for the launching. The carpenters build under her huge bulk the launching ways. Two ground ways, for all the world like the boardwalks at an ocean resort, are secured to the ground. The sliding ways are made fast to the ship to take the plunge with her. Between the two is laid a thick layer of grease. By

driving wedges into the sliding ways the weight of the monster is transferred from its long resting-place on the keel blocks and other supports to the ways alone. The keel blocks and supports are then removed and only two heavy oak ties hold her back from the dive.

The veil of secrecy is lifted on the great day of the launching and a distinguished company is assembled on the flag-decked platform at her bow. On a given signal the oak ties are sawed in two, and as the

THE TRAILING CHAINS CHECK HER HEADWAY

giant moves slowly toward the water the sponsor breaks a bottle of water, swung in a nest of silken ribbons to keep the fragments from flying, on the steel bow and christens her. The sponsor is always a woman selected by the Governor of the State for which the superdreadnought is named, and her choice is a great honor. A band plays and a mighty shout from the guests and the happy workmen follows her as the sea-fighter gathers momentum and strikes the water with a mighty crash. The heavy chains looped along her sides are released when she takes the water—"water-borne," the shipyard calls it—and, trailing behind, check her plunge.

Fussy tugs nose her into the shipfitting basin, where giant cranes

swing into place her turrets, guns, and armor. The masts, deckhouses, and other fittings are erected; and after the machinery and boilers are swallowed up in her holds, hatches are fitted over the openings. The smoke-stack rears its great column, and she is ready for cleaning and the final coat of war gray.

Out she steams to a measured-mile course at sea, with the American

WATER-BORNE

flag at her taffrail and the builder's red flag at her maintruck. He must prove to the Navy Department that his engines can drive her over that mile at the guaranteed speed, that her fuel consumption does not exceed a certain limit, and that she can pass other tests of speed and endurance.

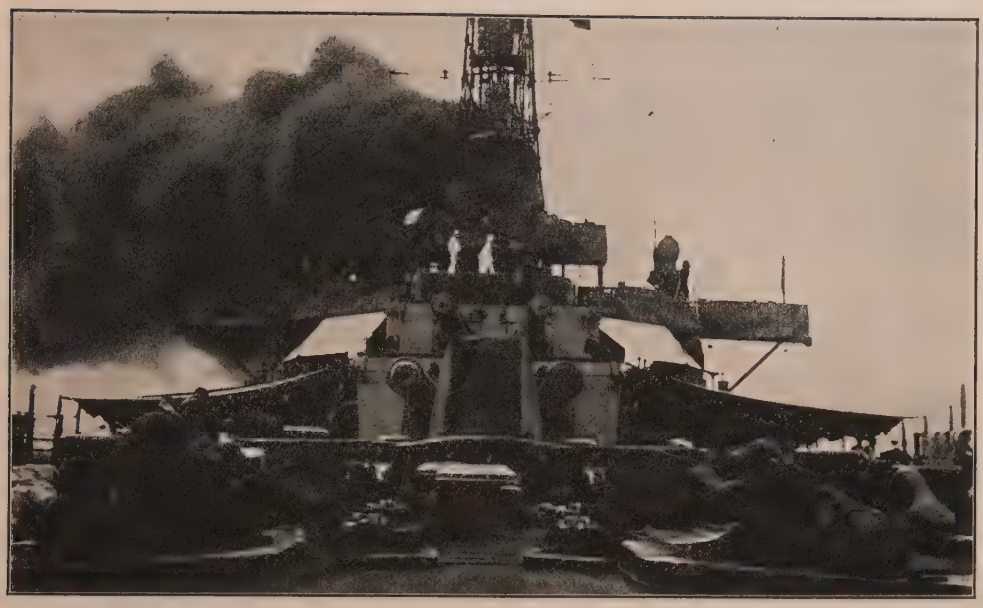
Success crowns the trials and the builder delivers her to the Commandant of her designated navy-yard. Here she is fitted out with ammunition, stores, and supplies. The day comes when the Commandant turns her over to her Captain, a finished superdreadnought. Twenty months have come and gone since the laying of her keel, and a thousand men have put their best into her.

It is a gala day for the Navy when her newest and most powerful fighter is ushered into the Fleet with picturesque and colorful initiation. Officers and crew, a thousand in all, are drawn up in ranks on her broad decks. The Commandant, with the broad gold stripes of a Rear-Admiral on his sleeves, and his sword at his left side, reads aloud the Secretary's order placing the Captain in command. The American

INSTALLING HER 16-INCH GUNS

flag creeps slowly up the hoist, with the crew at attention, the marines presenting arms, and the drummer and bugler playing the "ruffles" and "flourishes" to the national colors. The ship's band crashes into the national anthem, and at its last note the thousand men who are to sling their hammocks on the splendid fighting machine bring their right hands down smartly in the end of their salute. In a few well-chosen words the Captain greets his crew; bugles and bosun pipes shrill their "Carry on!" and the superdreadnought is ready for active service.

THE GIANT "CALIFORNIA"



Courtesy of "Fleet Review"

LOOKING AFT FROM A DREADNOUGHT'S BOW

IV

ALL AROUND A BATTLESHIP

IF the safety of the United States should ever depend on its Navy to keep an invading fleet from its shores, the battleship will have to bear the heaviest burden, for she is the backbone of a navy. She is the only fighting ship that can keep command of the seas by taking it and keeping it in all weather and fighting the enemy's strongest ships. She is the acknowledged champion of the seas, with the heaviest guns and torpedoes, and the greatest protection of massive armor. Her place is in the main line of battle, for she can give and take the heaviest blows. The issue of a great sea fight, after the smaller vessels have been driven behind her lines or sunk, will be the battle of these giants.

The ships that first brought fame to the American flag were the wooden ships of the line. The largest had batteries of seventy-four guns of varying sizes on two or three decks. The thick oak sides stood terrible punishment in those days from the round shot poured into them at short range.

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OUR EUROPEAN SQUADRON IN 1872

Steam and iron ended the reign of the wooden ship of the line. The first fight between iron ships came in the meeting of the *Monitor* and the *Merrimac* in the Civil War. The *Monitor* was the beginning of the battleship era, for she was the first ship in which the principle of a few of the heaviest guns was matched against many smaller ones, and an attempt was made to give real and not partial armor protection to guns and engines.

Courtesy of "Scientific American"

THE WORLD'S FIRST DREADNOUGHT

Then came the battleship, a triumph of steel and steam. The *Massachusetts, Oregon,* and *Indiana,* all heroes of the Santiago fight, were the first laid down for our Navy in 1890. They were great fighters, but they had but one-third the displacement of our newest dreadnoughts, and their guns were but one-half the caliber of the ones now building. Then came bigger ships, bigger guns, and heavier armor. In 1906 the British launched H.M.S. *Dreadnought,* the first all-big-gun-ship, and the ships that followed were all known as dreadnoughts rather than battleships. Our first dreadnought was the *Delaware.* It was long the pride of the American Navy.

To-day we have built superdreadnoughts which carry big guns

THE "NEW MEXICO" STANDS OUT TO SEA

of only one caliber, two to a turret, mounted all on a center-line, the guns of one turret above the other, to give the heaviest broadside and the greatest field of fire. Her secondary battery guns are for torpedo defense or attacks by aircraft, and she has two military masts and two stacks. Her armor is the heaviest and she carries a crew of 1,400 men.

Let us board the *West Virginia,* which, with her sister ships, the *Maryland* and *Colorado,* shares the honor of being the most powerful dreadnought flying our flag.

The Washington Treaty of 1922 scrapped six incompleted American battleships superior in tonnage, guns and speed to the *West Virginia.*

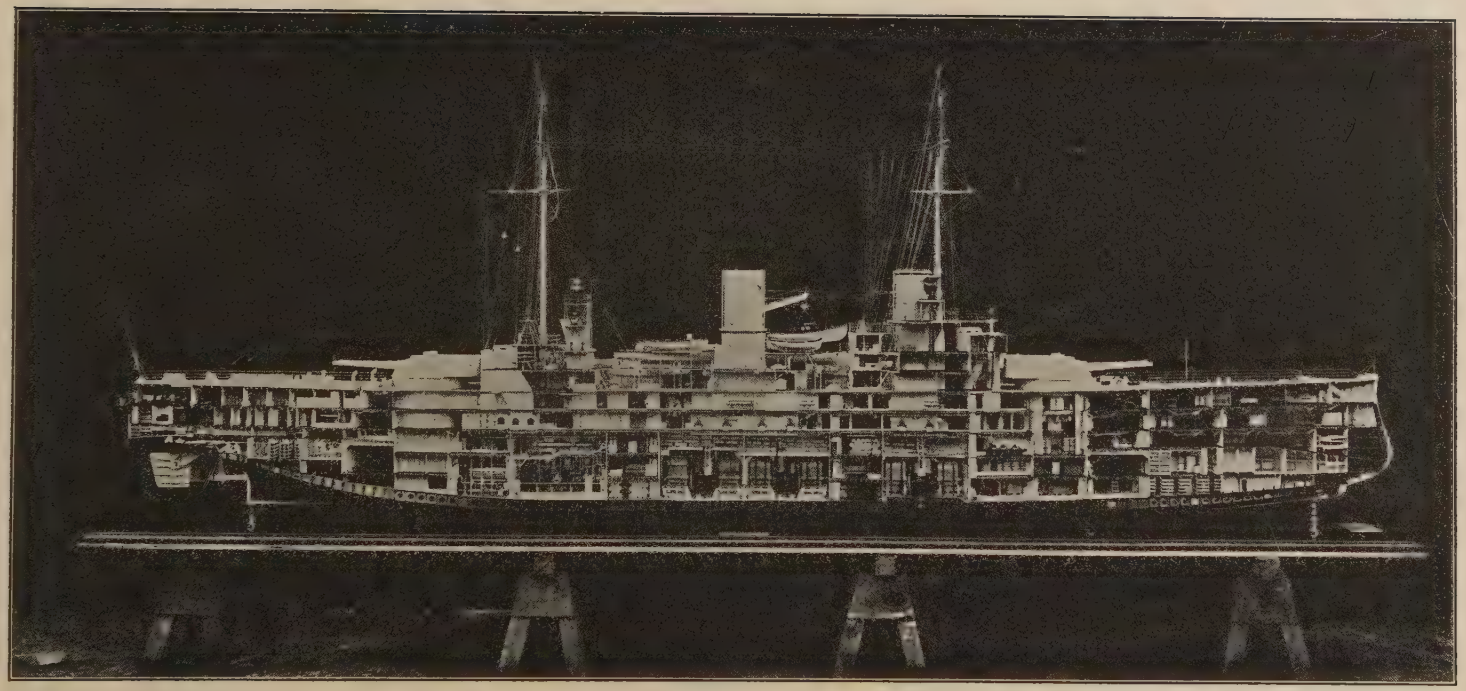
You are first struck by the wonderful sweep of the deck from bow to stern, for she is 600 feet long. While not so long as the greatest ocean liner, she is much wider in proportion, with a beam one-sixth her length. An officer or bluejacket will gladly show you over her; but if the officer of the deck calls a bluejacket, do not make the mistake at the end of your tour of offering him money. That he will resent. All he asks is a hearty "Thank you!"

First of all you learn that the ship displaces 32,600 tons of water with her guns, armor, and other details, and perhaps you wonder how so heavy a mass of steel can float.

It was Archimedes, a Greek mathematician, who discovered that when an object floats on water it displaces, or pushes aside, an equal weight of water. But place a piece of tin in the water and it sinks. Shape it into a tin can and it floats. In its flat shape it does not really displace water, so an object floats not from its weight but its form. Fill the can with water and drop in a stone. The water that flows over the sides will be exactly the weight of the stone.

The big turrets with their twin guns catch your eye. Each of the big guns, you hear, weighs 105 tons and is 73 feet long. Each fires a 2,100-pound shell when loaded with smokeless powder that weighs 570 pounds. It costs Uncle Sam $950 to fire this gun in battle. When you learn that all eight 16-inch guns can be fired in one broadside and throw seven and a half tons of steel at a target you are staggered. The bluejacket smiles and tells you that for each pound of that broadside the actual cost is $1,082, for it cost $30,000,000 to build and equip the *West Virginia* before that broadside could be fired.

You look at the great steel tubes, rigid as the Rock of Gibraltar, and you smile when he tells you that the shock of firing actually sets them vibrating. The vibration is small and it is called the "whip" of

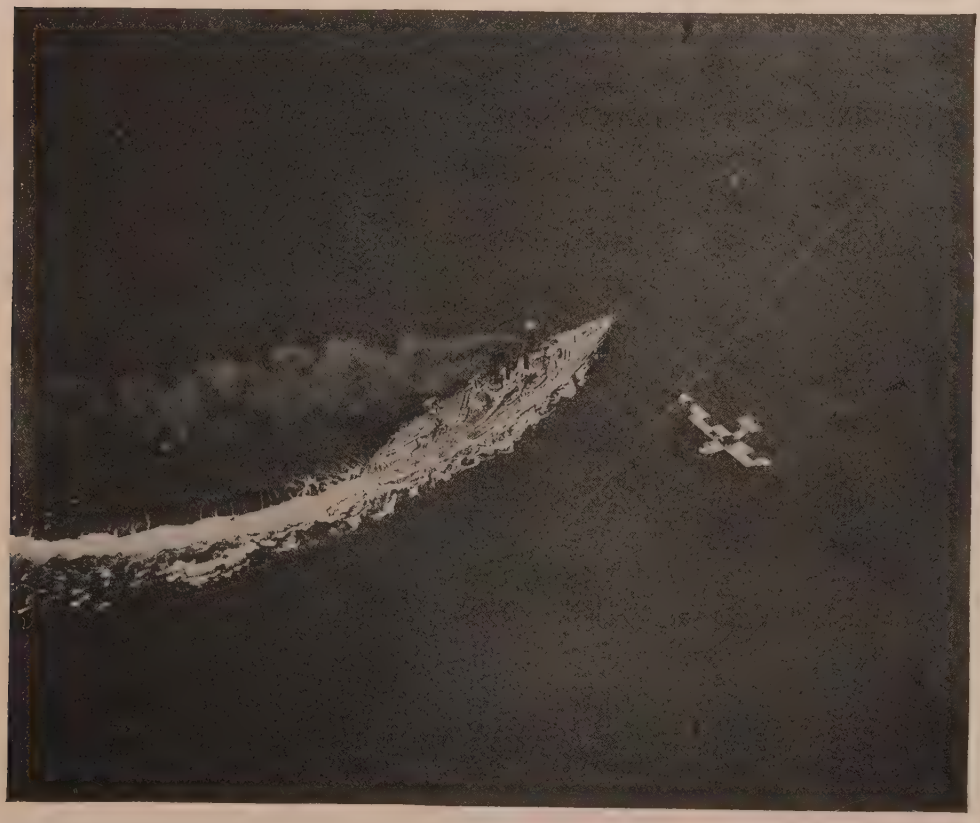


Courtesy of "Scientific American"

A BATTLESHIP LAID OPEN

the gun, just the same on a smaller scale as the "whip" of a fishpole when you shake it.

One of the muzzles is open and you wonder what the shining wooden plugs with the brass five-pointed star in the others are for. They are tompions to keep the spray from dashing in and rusting the steel bore. Even the little six-pounders that fire the *West Virginia's* salutes have them.



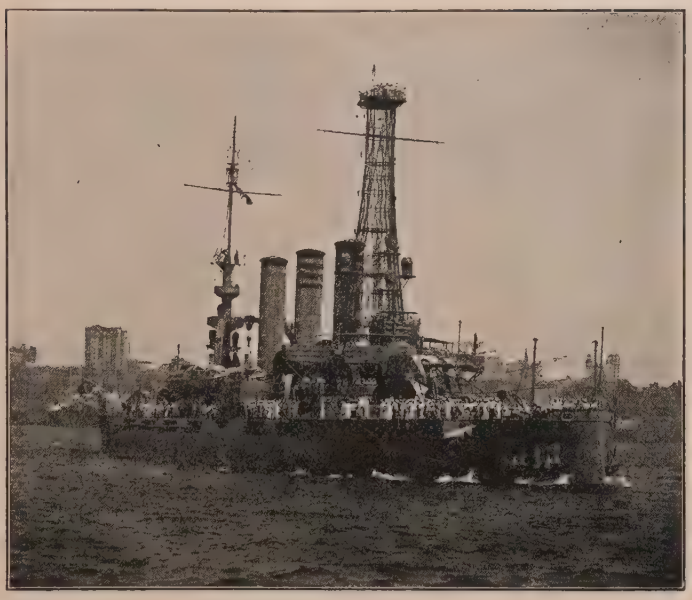
THE "ARKANSAS" CHANGES COURSE TO ESCAPE TORPEDO LAUNCHED FROM PLANE

How are the turrets moved? you ask. By motors that revolve them on a path with steel rollers between the path and the turret like the tiny steel balls in the ball bearings of a bicycle. An American, T. R. Timby, invented the revolving turret, and Ericsson, their first builder, paid him a royalty of $5,000 on each turret that he built.

Before you leave the after turrets to go forward with your guide

HEAVY WEATHER IN THE GULF

you must learn more about the fascinating subject of the *West Virginia's* armor, for it is one-fourth her total weight! On the triple turrets the thickest is 18 inches, and on the barbette—the stem on which a turret revolves—it is 13 inches thick. The heaviest, of course, is on her waterline, to protect her from torpedoes and shells that would otherwise burst in the vitals of her machinery or magazines. This armor belt runs nearly three-fourths of her length, in a strip 13½ inches thick, and from top to bottom 17 feet wide with one-half below her waterline. Then there must be armor for the conning tower of 16 inches, to say nothing of the armor for the base of her stacks.



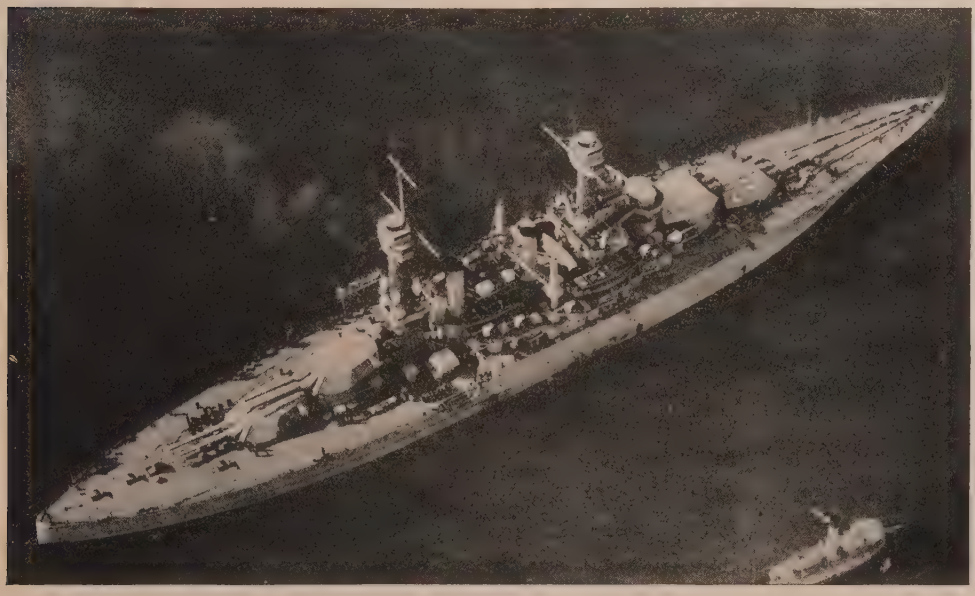
THE "RHODE ISLAND" AT ANCHOR

THE TURRET CREWS ARE ALWAYS AT PRACTICE

You look at the spotless wooden deck at your feet and innocently ask why it is not armored too. Three and a half inches below you runs a steel deck, while the next deck below is the armored protection deck to cheat falling shells and the

STEAMING THROUGH SUNLIT SEAS

bombs of Zeppelins or aeroplanes from piercing it, but a deck of metal would be unbearable to bare feet in the tropics. The wood is teak, an expensive wood, but much better than the yellow pine on the older ships, and its seams do not spread.



WITH DECKS CLEARED FOR ACTION

Forward we go, with some of your curiosity satisfied but still keen for more facts about this modern fighting machine. Passing the after military mast we come to a house-like building called the superstructure. In its steel walls are the galleys or kitchens, the bakery, blacksmith shop, and many other interesting and necessary spots that make the superdreadnought a floating city, a workshop, and an arsenal for one thousand four hundred American bluejackets.

THE "WEST VIRGINIA" IS OUR MOST POWERFUL TYPE

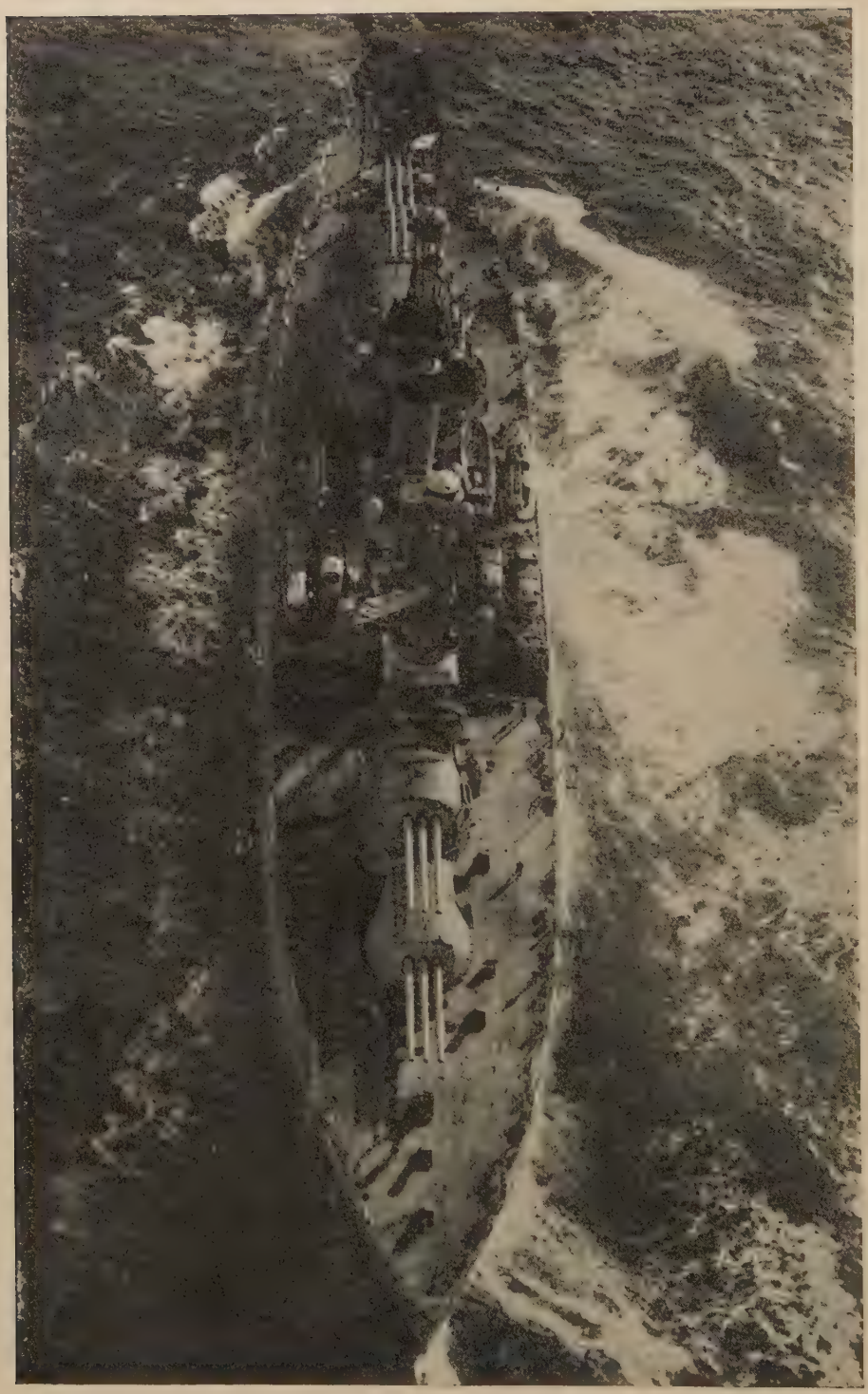
The *West Virigina's* galley is oil-burning, not so interesting as the electrical ones of the *Nevada* and *Oklahoma,* but our ship burns oil and it is more economical to use it also in the galley. Oil is the best fuel and is rapidly driving coal out of the Fleet. The crew hailed its coming with delight, for, although the band plays through the coaling of a ship, there is no task so fatiguing or disagreeable. Oil is almost smokeless, too, and the oil-burner increases or reduces speed more quickly; and the space formerly taken up by coal-bunkers now adds greatly to the berthing space and comfort of the men. Instead of the endless procession of heavy coal bags and the clouds of coal-dust the *West Virginia* takes her oil on board from a hose attached to an oil barge, with no more fuss than the turning on of a kitchen spigot. In her tanks she carries 2,300 tons of the heavy oil.

Just as we pass the superstructure we see the steel conning tower with its roof peeping above the after forward turret. Here is the Captain's station in battle and it has been called the brains of the ship. It has communications leading to all parts of the ship through armored tubes protecting them until they come within the shelter of the side armor. As the conning tower is a small target, and so heavily protected, it will stand the heaviest punishment and may be the last spot from which the Captain can fight and navigate his ship.

Forward, on either side of the deck, run great anchor chains along steel plates, with their own engines for lowering and hoisting the anchors. We are now up in the "eyes" of the ship, where the chains lead through the yawning hawse pipes, and you recall that when you saw the bow before coming on board, in place of the knife-like stem you had expected to see, the *West Virginia's* bow was a wide, flaring clipper bow, somewhat like that of old sailing ships. Like everything aboard ship there is a good reason for the clipper bow, for the wide flares keep seas from tumbling on board as in the old battleships, and the turrets are not bothered with the pounding of the seas nor their telescopes by flying spray. It has made the forecastle, a favorite spot of the crew, much more livable at sea.

We turn back to the bridge, a mine of interesting details, crammed with devices that are in constant use in fighting and sailing. Your bluejacket friend calls them "gadgets." Amidships of its length is the signal locker, and when you lift the lid the racks are gay with bunting. At either wing are the hand searchlights. Compasses, steering wheels, dials, speaking-tubes and telephones that connect with all parts of the ship greet your eye. Just off the steel ladder is a flat lever. Turn this lever and the great ship would resound with its

THE BATTLE FLEET KEEPS THE SEA IN ALL WEATHER



BOMBING PLANE'S VIEW OF ITS TARGET

alarms for collision or fire drill, clear ship for action, general quarters, abandon ship, or night torpedo defense drill, as the case may be, and the battle-gongs, sirens, howlers, and other ear-splitting devices would send every man to his station.

Quartermasters and signalmen are on the bridge night and day. At sea the officers charged with her handling drive her through fog and storm, blue waters and crowded harbors.

We look aft from the bridge along the superstructure deck and, high above the pulling boats, the motor boats and steam launches, towers the forward military mast. Here are lockers filled with fresh vegetables or boat gear and the four wicked semi-automatic aircraft guns that the Navy calls "sky guns." They fire 5-inch shells at an angle up to 80 degrees at any Zeppelin or other aircraft that may fly above to drop bombs on the crowded decks. The mast looks for all the world like a giant waste-paper basket turned upside-down, and its interwoven, braced lattice-work is really stout steel tubing. One lucky shot would carry away the old-style mast, but the military or fire control mast will stand much battering and still survive a battle. At the top of the lattice-work is a circular platform, where the spotters and range finders are stationed in battle; and high above water are the slender wireless aerials. Signal yards jut out from the mast, with their halliards fastened at the bridge. On the mast are projections supporting powerful searchlights and the fire control for defense against torpedo attack.

Leave the bridge and visit the deck below the superstructure and you are on the gun deck. On this and the berth deck below the crew live. They are divided by steel bulkheads into compartments called casemates, on most dreadnoughts, and the men who serve the gun in that casemate sling their hammocks, sea-bags, and other gear there. Mess-call sounds as we enter one of them and down from racks overhead come mess-tables and benches. If you could tarry until "hammocks" you would see these, also, slung overhead from two steel hooks.

Farther aft, below the quarterdeck, are the officers' quarters, a separate suite for the Admiral and the Captain, and for each officer a room opening out on the same deck or the one below and near the wardroom, where the officers gather for their meals and pass their few spare hours. Nearby is a similar arrangement for the junior officers, once called the "steerage," and there are other comfortable quarters for the warrant and petty officers, and reception rooms,

showers and baths for the crew. On these decks there are laundries, a barber shop, the crew's reading and reception rooms, the spotless sick bay, or hospital, and the operating room.

Overhead a white pipe with a band of green and black catches your eye, and as you pass along the decks you see the same band at intervals. It is a salt-water pipe and the bands make it easy to trace it for leaks or repairs. The fresh-water pipe is lead-colored, and the ones painted with yellow and black bands carry fresh air to the decks below the main one.

The paint on these pipes is smooth and glistening but on the steel

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THE "PENNSYLVANIA" STEAMS UNDER BROOKLYN BRIDGE

WEATHERING A GALE

walls you will often see a rough, jagged sort of paint. It is a sticky paint in which broken cork has been mixed. The cork paint keeps the steel beneath it from "sweating" and forming beads of moisture; it also keeps the ammunition passages and the magazines at an even temperature by absorbing their moisture. In other parts of the ship great slabs of cork are placed behind steel plates for the same purpose.

Of course we want to see the great engines that drive this mighty ship through the water at twenty-odd knots, so we turn down a narrow steel passageway and down a steel ladder to another steel deck. What a surprise is in store! You had forgotten that the *West Virginia* is an oil-burner. There is no roaring furnace with half-naked stokers throwing in coal, and the racket of slice-bars and clanging shovels. There is no network of flying machinery, throbbing pistons and whirling controllers. There are boilers, gauges, valves, and steampipes, but only the steady roar of the burners keeping up their flame. The turbines work so silently that it is hard to realize that they can drive this great bulk of 32,600 tons.

We are now well below the waterline, but still below us are the double bottoms and the bilges before the keel is reached. Here, between the inner and outer hulls that we call the double bottoms, are stored the oil fuel, spare stores for men, guns and machinery. The handling rooms for the turrets also are below the waterline, as are the magazines and the fire-control room and the wireless room. In the center of the handling rooms run the elevators that hurry shell and powder to the hungry breeches above. Below it are the four 21-inch torpedo tubes.

On all the decks you pass men who turn from their tasks to fling a greeting to your bluejacket escort, and a smile for yourself. Their number is based on the men required to fight, navigate, keep up full speed through a battle no matter how long it lasts, attend the wounded, clear away wreckage, make repairs, fight fires, and keep the communications working.

The *West Virginia* has not only its Admiral with his staff, but its captain, executive, gunnery, navigating, engineer, first lieutenant, watch, medical, pay and marine officer, and most of them have one or more assistants, to a total of more than forty officers.

You come back on deck sobered by the picture of power you have seen and a better American for the trip. Nothing gives a greater impression of power and efficiency than a superdreadnought, with its massive armor and its wicked guns. It seems as though such a ship could never be surpassed; but already we are building and planning

bigger and better ones, for the life of a battleship is only twenty years. The life of her great guns is less than 300 rounds, but the guns can be relined.

By the Treaty for the Limitation of Naval Armament we agreed to the scrapping of 30 capital ships, of which six would have eclipsed the *West Virginia*. Therefore the *West Virginia* will for years be our most powerful type, with her great guns hurling their 2100-pound shells to a distance of 20 sea-miles, and at 19,000 yards no armor afloat will withstand a hit from these guns. Despite the development of aircraft with their great bombs, and the strides made by other types of surface and under-water craft, the battleship is still King of the Seas. It can not only inflict the greatest damage to all other types, but it still remains capable of staying afloat and fighting her guns under punishment that staggers the imagination.

THE "CHARLESTON" IS ONE OF OUR LARGEST PROTECTED CRUISERS

V

THE QUEEN OF THE SEA

FASHIONS in ships change much like the styles of dress on shore, and the cruiser is no exception to this rule. From a very minor part in the Fleet the cruiser in its latest form—the battle cruiser—is now the Queen of the Sea, as the superdreadnought is the King of the Sea. Largest and fastest of all warships, with guns almost as powerful as those of the King, she is well entitled to her crown, for only in armor does the King really outstrip her. In fact the battle cruiser is a high-speed battleship, and her development from the minor rôle to her present proud position is an interesting one.

Cruisers began as little fellows, not much larger than a modern sea-going tug, and their only superiority over other ships then was their speed. The first ones were 1,500 tons—hardly one-twentieth the tonnage of the battle cruisers of the British Navy—and their first protection was of iron. They were useful little craft; but the strides made in rapid-fire guns and explosive shells soon made them useless. Steel armor of light weight was added to them, and they became known as protected cruisers. Between 1883 and 1886 the White Squadron was the pride of the American Navy, and the *Chicago,* the *Dolphin* and the *Boston* are still on the Navy list.

The guns scored again, and it was France who led the way for

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A BATTLE FLEET IN ACTION

other nations by building the first armored cruiser, the *Dupuy-de-Lome,* in 1888. She was of 6,500 tons, 20 knots speed, and with her heavier armor of 4-inch steel and two 7.6-inch guns in turrets the *Dupuy-de-Lome* was a remarkable ship for that time.

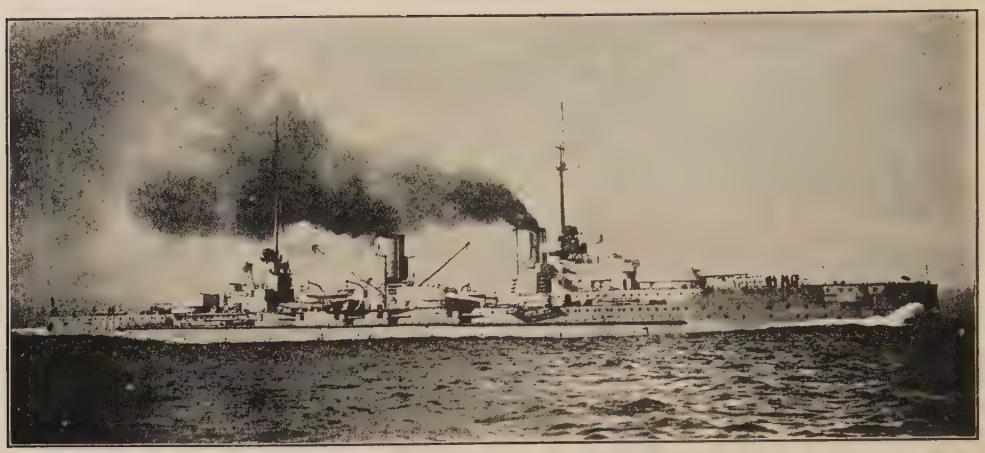
All other naval powers followed France's lead, and among the ships built on her lines by the United States was the famous *Olympia,* Admiral Dewey's flagship at Manila Bay.

The protected cruiser was now useless and we were approaching the day of the battleship. The armored cruiser was designed for sea

THE "CHICAGO" WAS ONE OF OUR FIRST CRUISERS

scouting and coast patrol, and in that class the United States rapidly took the lead with her four cruisers of the *Montana* type. Other improvements in ordnance and gunnery again outstripped the cruiser. While the *Brooklyn* and the *New York* held their own with the battleships in the great Santiago sea fight, and Admiral Dewey's cruisers humbled the Spanish fleet at Manila Bay, their place in the line of battle is over.

Cruisers are generally designated as of the following types: battle cruisers, first and second-line cruisers and first and second-line light cruisers. We have eleven second-line cruisers, ranging from 8,000 to 15,000 tons, with a speed of 21 knots, guns ranging from 6 to 10-inch, and side armor up to 6 inches. The best of them are sturdy fighters,



Courtesy of "Scientific American"

THE GERMAN BATTLE CRUISER "VON DER TANN"

Courtesy of "Scientific American"

THE FAMOUS GERMAN BATTLE CRUISER "GOEBEN" ELUDED THE BRITISH FLEET IN THE MEDITERRANEAN

but their lack of high speed bars them from a place in the battle line of a major engagement. They will be found protecting the convoy of a large force, escorting smaller convoys of troopships and merchantmen and on miscellaneous service.

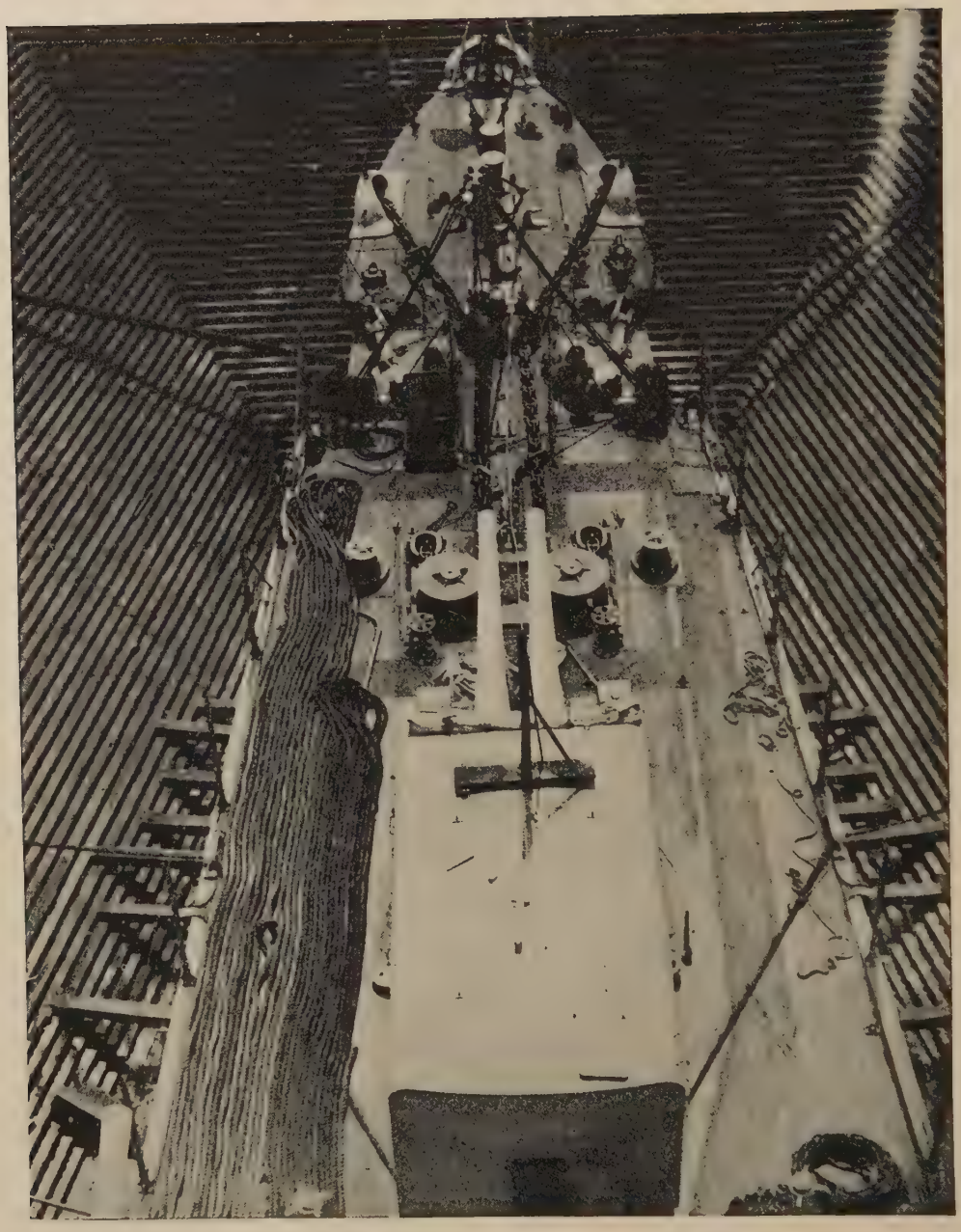
In the first-line cruisers we have ten of the *Memphis* class, with a 33-knot speed, 7500 tons displacement, twelve 6-inch guns, torpedo tubes, light side and deck armor, carrying two seaplanes for observation purposes. Most notable of the eleven cruisers of the second-line light cruiser force are the three of the *Salem* type. With half the tonnage of their first-line light cruiser force, they have a speed of 22 knots, 5-inch guns, no armor and a limited radius of action. In appearance they look like super-destroyers.

The light cruisers in battle are assigned to the wings with destroyers screening them, and when the Fleet is cruising they operate as part of the screen to prevent surprise attacks by destroyers or submarines, and to fight any light forces that may penetrate the screen around the main body.

It was Great Britain that gave to the sea its first battle cruiser. Where the battleship sacrifices speed to carry the greatest number of powerful guns and at the same time the heaviest armor so that she can take as well as give punishment in a stand-up fight, the battle cruiser has as her greatest feature speed. The guns she does carry are as powerful as those of the superdreadnought, but only by reducing their number and the thickness of her armor is this feature secured.

With her wonderful speed she can run down and sink any craft on the sea except the battleship; and when she meets this grim fighter the battle cruiser can fight or run as she chooses. Scouts, destroyers, and submarines are her natural enemies, but they are also her easy prey. With her speed she can steam far ahead of the main line and find out how strong the enemy is and where it is. After smashing his screen of scouts she carries back the news to the main line and joins it for the final fray. In the big battle the battle cruisers form a fast wing that keeps the enemy ships from "capping" or crossing the line at right angles, they protect its flanks, take their chances of battle, and, if the end is victory, pursue and harry crippled ships. Their powerful torpedo battery helps make up for the lack of armor.

Besides scouting and fighting, her great fuel capacity and speed make the battle cruiser an even more useful ship than the superdreadnought, for she can raid an enemy's coast and destroy her commerce. With the speed and dash of a destroyer and her powerful



DECK VIEW OF THE "CONCORD" IN DRY DOCK

Courtesy of "Scientific American"

THE BRITISH BATTLE CRUISER "QUEEN MARY" LOST IN THE GREAT JUTLAND BATTLE

Courtesy of "Scientific American"

A GERMAN SHELL SUNK THE "INDEFATIGABLE" OFF JUTLAND

Courtesy of "Scientific American"

LACK OF ARMOR LOST THE "INVINCIBLE" TO GREAT BRITAIN AT JUTLAND

battery, the battle cruiser is the favorite topic where naval officers meet. Her cost is even greater than that of the superdreadnought and she is more expensive to keep in commission. She has in her speed greater safety from attack by destroyers or submarines than her big brother and she is little inferior to him as a fighter.

Great Britain, as we have said, was the first naval power to build the battle cruiser. Close on her heels came Germany, Russia, and Japan; but all others, including the United States, had no battle cruiser in their line of battle. It was in 1907 that the *Indomitable,* the first one, was begun. One year later she crossed the Atlantic at a speed of a little more than 25 miles an hour. The *Inflexible* and the *Invincible* followed; and when the World War came, Great Britain had a squadron that proved of immense worth to her.

The latest development in light cruisers, which are of growing

THE SCOUT CRUISER LOOKS LIKE A SUPER-DESTROYER

importance as the link between the battleship and the destroyer, is due to the limitation of size and guns for light cruisers that was imposed by the Treaty for the Limitation of Naval Armament of 1922. By the terms of this treaty light cruisers must not exceed 10,000 tons nor carry guns greater than 8-inch in caliber. The cruisers that are now being added to the navies of the world under this limitation are familiarly known as scout cruisers, and while they are officially designated as light cruisers, and not scout cruisers, we will refer to them by their popular name of scout cruisers.

In the same treaty the United States agreed to complete no battle

cruisers, although, if completed, they would have outranked in size, speed and armament those of any other navy. The *Lexington* and *Saratoga,* the nearest to completion, were converted into aircraft carriers, and the rest were remorselessly scrapped. Our interest, therefore, centers on the new 10,000 scout cruiser, which is generally designated in all navies as the Washington cruiser. Foremost is their task of scouting to secure information of the enemy in regard to his location, strength and movements. Armed with this information the main body is in a position to join battle or to evade it. The scouts are also charged with the mission of denying to enemy scouts the information that the latter are seeking.

THE SECOND LINE CRUISER "OMAHA" IS A STURDY FIGHTER

In battle, when the main forces are engaged the scouts operate on the wings in combat with the enemy's light force of cruisers and destroyers. To provide for this combat the scout's armament has been greatly strengthened, and its cruising radius developed so that it may operate efficiently with the Fleet at great distances from a home base. To screen the battle fleet against surprise, and guard it against torpedo attacks it must have both armament and speed equal to this important duty.

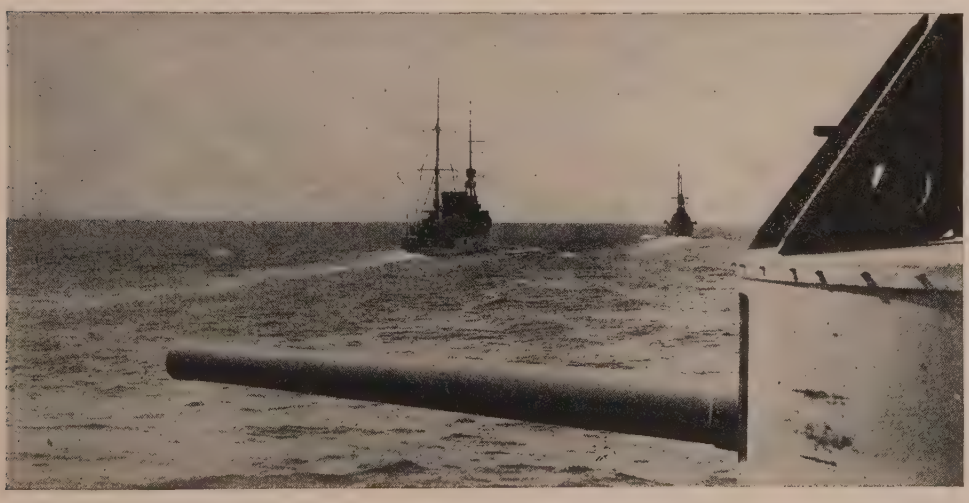
It is also designed to operate both in the escort of commerce carriers and to defend them against enemy cruiser attacks. As raiders against the enemy's commerce and the lines of communication that lie between the base of an enemy and the enemy battle fleet, cruisers of this type have no equal. In the World War fast German raiders

THE HULL OF THE "SARATOGA," CONVERTED FROM BATTLE CRUISER TO AIRCRAFT CARRIER, IS LARGEST EVER LAUNCHED IN U. S.

performed remarkable feats before the British warships ran them down and sunk them, or they sought refuge in a neutral port, there to be interned for the duration of the war.

The scout cruiser, as compared with the battleship, is one-fourth its size. Unlike the battleship its hull cannot be divided to give great protection against a torpedo, mine or bomb that is exploded under water close to its hull. It sacrifices this characteristic of the battleship to gain its far superior speed of 34 knots, and it carries little armor as protection for the same reason. It is speedy enough to evade combat with the capital ship. Against a destroyer it has equal speed and far more powerful guns, with a steadier gun platform that gives it a tremendous advantage. Against aircraft it presents a comparatively small target, has its anti-aircraft guns, and speed and ability to maneuver quickly. Against an enemy cruiser of similar strength the decision must rest with the cruiser that has superior marksmanship and is better handled.

Congress authorized the construction of six modern scout cruisers, and this building program is being put through as fast as the money is appropriated for their construction.



DIVISION OF SCOUT CRUISERS ON MANEUVERS

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A DESTROYER'S GUN CREW IN ACTION

DESTROYERS LAYING A SMOKE SCREEN

VI

THE DESTROYER

SPEED has a peculiar fascination for Americans, and speediest of all warcraft afloat is the torpedo-boat-destroyer, or, as it is generally known, the destroyer. Added to this quality of high speed is the deadly weapon of the destroyer, the torpedo, and in a duel between battleship and destroyer the victory may go to the gallant little fighter for the most deadly foe to the battleship is the torpedo.

The development of torpedo craft into the present type of destroyer is one of the romances of the sea. Beginning with the development of the automobile torpedo came the need for an exceptionally fast craft to carry and fire this deadly missile. The range of the torpedo in those days was very limited, and to deliver the attack before a warship's guns had sunk the torpedo boat, it was vitally necessary that the torpedo boat must attack at high speed.

As this threat grew with the feverish building of torpedo boats the necessity grew for a still faster vessel whose mission was to hunt down and destroy them, and thus banish the nightly dread of a torpedo attack. At first this new type, aptly named torpedo-boat-destroyers, depended solely on its superior speed and its rapid-fire guns. It was

DESTROYER "STEVENS" IN WAR CAMOUFLAGE

WITH TORPEDO TUBES TRAINED AND READY TO FIRE

THE "BELKNAP" CARRIES A BONE IN HER TEETH

not long before it was seen that, armed with torpedoes, it would be a super-torpedo-boat, capable not only of ridding the seas of the torpedo-boat, but of delivering a formidable attack at night against the enemy's battleships.

Briefly this is the story of the development of the waspish torpedo-boat that ranged in displacement of from 50 to 300 tons to its present bulk of from 350 to 1500 tons; in speed from 19 knots to a maximum of 40 knots; from its original armament of 3-pounders to its present 4-inch gun; from its short-range torpedo to one that travels as far as 15,000 yards with its maximum speed as high as 29 knots; from its limited use through its inferior seaworthy qualities to ability to cruise 5,000 miles without refueling and to keep the sea while a gale rages.

With the torpedo as its main offensive weapon, the modern destroyer depends on its high speed and small size as a target to evade punishment by the powerful surface craft. Against its natural enemy, the submarine, the destroyer relies on its great speed and quickness of maneuver to outwit the underwater scourge, and its 4-inch guns and powerful depth charges to destroy it.

Not until the World War was the destroyer able to demonstrate its great value as an arm of the Fleet.

AT THE SAN DIEGO BASE

SEAMAN MAKING HIS WAY BY TROLLEY IN HEAVY SEAS

In the Battle of Jutland, the greatest of modern sea-actions, the destroyers on both sides did valiant work. Ably handled by the Germans they played an important part in two critical phases of the running fight when their torpedo attacks, and their very menace of torpedo attacks, forced the British battle line to turn away, and allowed the weaker German force to make good its escape into the fog and mist. In the night battle they figured conspicuously and in the day action took their toll of battleships and cruisers.

Its greatest usefulness, however, in the World War, was as a foil against the German submarines. Not only did they screen the battleships and cruisers from submarine attacks, but patroled submarine infested waters and convoyed troop and cargo ships through them with notable success. Fast, seaworthy, handy, and armed with their light guns and destructive depth charges, they were the submarine's remorseless foe.

When the Fleet puts to sea the destroyers play a vital part in the great screen that is thrown about the main body of the big force and its accompanying Train. This screen is usually circular in formation, with the battleships, aircraft carriers and vessels of the Train steaming in its center. On a thirty-mile circle are disposed either submarines or both submarines and destroyers. On an inner circle is a cordon of the speed destroyers, zigzagging back and forth in their hunt for prowling submarines or fast light craft that may try to penetrate the outer screen either by day or night. Still closer in is a third guard, with destroyers hovering about the cruisers assigned to that defense. Other divisions of destroyers steam by day as a screen against submarines, patroling those dangerous waters as a guard for the battleships. With the aircraft carriers are other destroyers on the anti-submarine screen duty, and circling through and around the convoy still other destroyer divisions.

In a day action, after the opposing forces have made contact, and deployed from their circular cruising formation into battle formation, the destroyers, working as divisional units, are stationed on the flanks and as anti-submarine screens about the battleship divisions and the Train. A determined and well-timed destroyer attack in force is calculated to throw a battleship force into confusion, helpless for the time to return the destructive fire of the opposing battleships. Ahead and on their flanks the battleship crews see the menacing streaks of the oncoming torpedoes. Some may find their target and rob the battle line of a powerful unit, but even if by zigzagging and sharp changes of course the battleships save themselves, their formation

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DESTROYERS ATTACKING THROUGH SMOKE SCREEN

Courtesy of "Our Navy"

A FLOTILLA BACK TO THE BASE FOR OVERHAUL AND UPKEEP

has become disorganized, and their fire effect has been nullified while the torpedo attack is on.

Off on the flanks of a far-flung battle line the light forces carry on a deadly duel, and here the swift destroyer fights the more powerful light cruiser with its torpedo and the enemy destroyer with its 4-inch guns. Its chief target, however, is the capital ship, and it is ever on the alert to place itself in position to launch its storm of torpedoes against battleship or cruiser. Another important function it

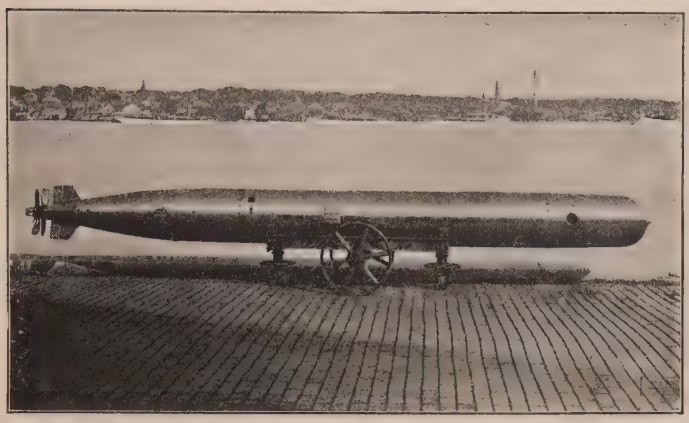
THE SUBMARINE'S SWORN ENEMY IN ACTION

will play in a great sea fight is to lay a heavy smoke screen to windward of a wing of the battle line, masking it against enemy gun fire or torpedo attacks, or by the same method to mask a maneuver of the battle line, or cover a disabled ship from further attack.

At night a torpedo attack, launched from one or more quarters into the heart of an enemy force, is the most dreaded of all attacks. Dashing in at full speed, while the attacked force plays its powerful searchlights, and fires its star shells to illuminate the scene, the destroyers rush fearlessly in. Once discovered by the rays of a sweeping searchlight its end may come swiftly as the avalanche of shells

is directed upon it, but if the destroyer has made its approach near enough to score a hit it has fulfilled its real mission.

As a scout to locate the enemy force the destroyer has great capabilities in some directions, but as compared to the scout cruiser, the fleet-submarine and the aircraft it can play no important part in the general search for the enemy. Its cruising radius hampers it in this work, and in bad weather its value is greatly restricted as a scout. Its real function is in its attack on capital ships, and out on the scouting line its worth would be wasted.



THE AUTOMOBILE TORPEDO, THE WEAPON USED BY DESTROYERS AND SUBMARINES

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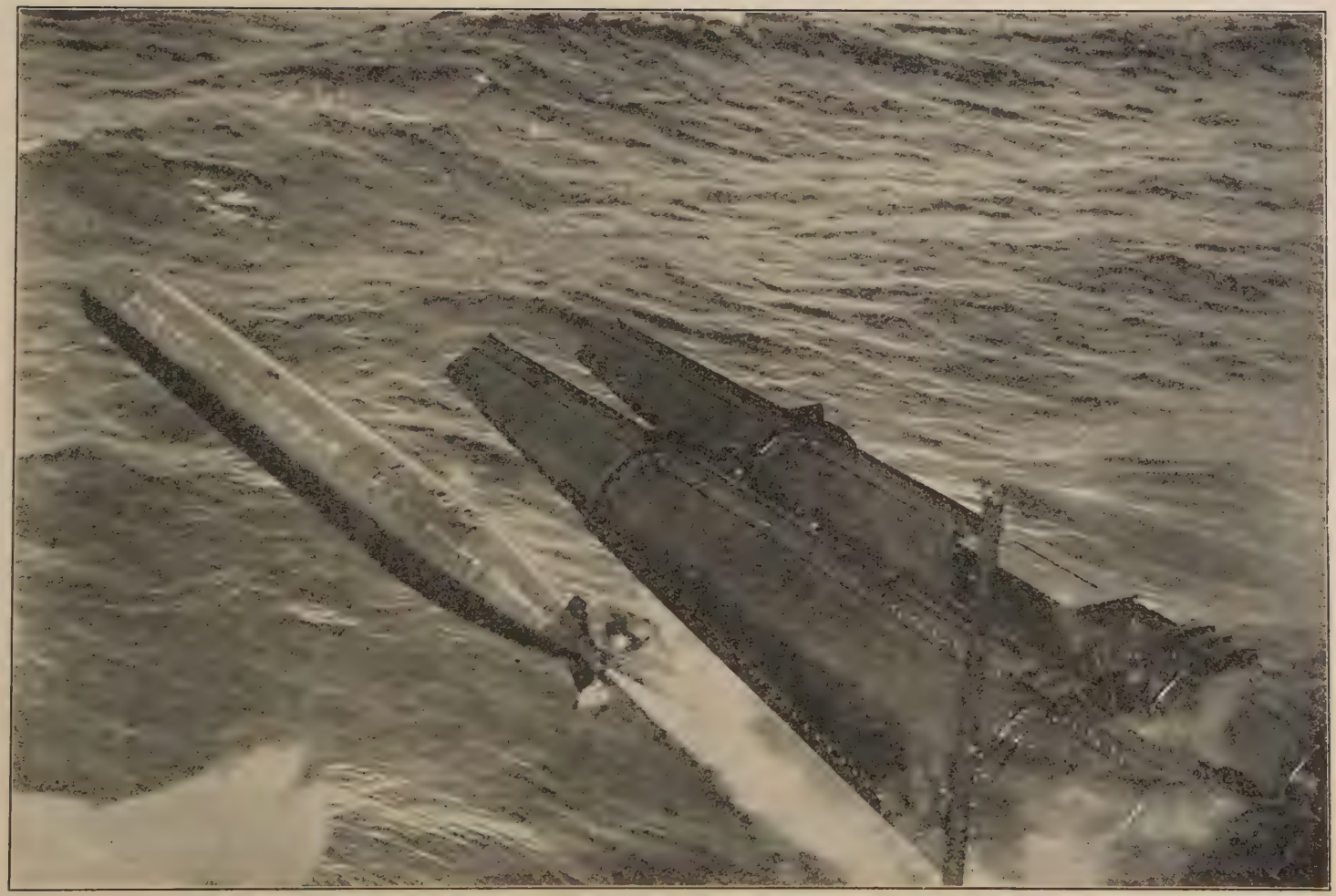
A TORPEDO ABOUT TO TAKE THE WATER

In the World War the American destroyers were our most spectacular and picturesque force. From the bases at Queenstown, Brest



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THE TORPEDO BEING LAUNCHED FROM THE TUBE

and Gibraltar, and other bases in the Azores and the Mediterranean they carried on their tireless quest for enemy submarines, were an important unit in the convoy of troopships and merchantmen, and supplied our overseas battleships with an anti-submarine screen during their operations. They had many brushes with the German U-boats and took their toll of them, and the story of the American destroyer overseas is one of heroic actions, of hazardous duty and splendid fidelity to their hard and exacting work.

The destroyer force of the American Navy to-day totals close to 300 of the first line. Some have been loaned to the Coast Guard for their hunt for rum-running ships, others are in ordinary with a skeleton crew, others are laid up out of commission. Those in full commission operate with the Fleet and its units, and destroyer duty is eagerly sought by the younger officers for in time of war no craft will be called on for more perilous and exciting duty.

The names of our first-line destroyers is like the roll-call of American naval heroes, for each has been named after some officer or enlisted man of the Navy and Marine Corps who has either distinguished himself in battle, or has contributed much of value to the Navy before he died either in action or otherwise.

Any story of the destroyer is incomplete that neglects its great weapon, the torpedo. The latest destroyers carry triple tubes of 21-inch diameter from which the torpedoes are launched. The destroyer torpedo costs $8,000 to manufacture and assemble. When completed, loaded with its warhead charge of 475 pounds of TNT and ready for a war shot it weighs 3,185 pounds, has a maximum range of 15,000 yards, and a maximum speed of 29 knots. The torpedo runs 15 feet below the surface and a hit against a battleship on the underwater armor will inflict damage that may either sink or totally disable the big sea-fighter.

Its accuracy is remarkable for in torpedo practice, with the target a small flag, and the destroyer steaming at 30 knots, a miss of more than a few yards is seldom made.

This practice is carried on with a practice head, similar in weight and size, substituted for the warhead. In this head is a chemical torch and at the end of the torpedo's run it gives off a bright flame at night, or smoke in the daytime, in order that the torpedo may be recovered. Inside the torpedo is an air flask charged with 2,800 pounds of pressure, with the air leading through a valve to the torpedo's engine. This engine drives two propeller shafts that in turn drive the torpedo at its high speed.

Many delicate adjustments are necessary before the torpedo is loaded into its tube and the tube door closed. The tube is then trained in the true direction of fire and its pointer is alert to train the tube on the target when it becomes visible. At full speed, sometimes covering its approach under a heavy plume of black smoke, the destroyer makes its run for the attack. At the proper range it turns sharply to bring its broadside to bear, the gun pointer takes his final aim and when the sights are true pushes his firing key.

The powder impulse charge explodes and the pressure drives the torpedo through the open end of the tube at a high rate of speed. As it leaves the tube the starting valve is opened and the engine begins to turn over. As the torpedo takes the water the throttle automatically opens wide and the torpedo is driving at its terrific speed towards the target. To keep it on this course, independent of currents or other factors, a gyroscopic steering gear holds it true.

Courtesy of "Our Navy"

TORPEDOES RECOVERED AFTER PRACTICE RUN

It is easy to see that the officers and crew of a modern destroyer must be highly trained experts to make the most of their powerful weapon of attack. The handling of a destroyer calls for the highest skill, for from bow to stern it is a complicated machine. The necessity for high speed has reduced every part of the vessel and its machinery to a minimum weight. The calls for maximum speed at a critical time demand a fire room and engine force of exceptional caliber. With its lively gun platform its gunners must be unusually expert. To fire its torpedoes requires a nicety of skill that must be developed by constant training and care.

Originally a British invention the torpedo was seized upon by France as the greatest weapon afloat, and the French built a great

Courtesy of "Scribner's Magazine"

DESTROYERS IN A SEAWAY

From a sketch made at sea by Henry Reuterdahl

DESTROYERS LAYING SMOKE SCREEN

Courtesy of "Scientific American"

A TORPEDO CAUGHT IN A NET

A DESTROYER IN STRIKING WAR PAINT

number of small vessels whose only weapon was the torpedo. Other powers, however, held to the battleship, built destroyers, and made the torpedo their secondary weapon, with the big guns the primary weapon, and as such it is now regarded by all navies. A weapon of opportunity it is, and the American Navy has paid great attention to its development.

Our two torpedo stations are at Newport, Rhode Island and Keyport, Washington. The Pacific Coast station is a storage point and place for testing torpedoes issued to the Pacific Fleet. Practically all through the year the battleships and destroyers on that coast use it in the overhaul of torpedoes and the instruction of the torpedo personnel.

At Newport the bulk of our torpedoes are kept for issue and ready for all demands. The instruction of personnel in the use of torpedoes is one of the major activities of this station. Junior officers undergo a rigid six months' course of training there with the enlisted men selected for that duty. The Navy rightly recognizes that only the best type of men should be assigned to this course for no other instrument of war is more powerful or more difficult to operate. A weapon of deadly precision when properly used, it is a valueless one when not coupled with personnel of the highest skill.

A GUNBOAT OF THE "YANGTZE" PATROL

VII

THE POLICEMAN OF THE SEVEN SEAS

THE beat patrolled by the Policeman of the Seven Seas is world-wide. No matter how obscure the corner in which American citizens or their property is threatened by a mob, an American gunboat is sure to poke its nose into the nearest port, swing her guns to cover the foreign quarters, send her landing party ashore with rifles and machine-guns, ready to stay there until peace reigns again. Their bulging gun sponsons and stacks that tower above, out of all proportion to their size, are as familiar a sight to the out-of-the-way ports as the policeman who patrols the block in which you live.

Many of these spots are so far inland, or their waters so shallow, that the big ships must lie miles out and send in boat crews; so this part of the Fleet's duty, the protection of our interests in any part of the world, has for years been assigned to our gunboats. The State Department has a real affection for the homely little chaps, for our diplomats and consuls have found them a faithful and trusty ally.

There is no ship's crew that leads so adventurous a life as that followed by those of the gunboat. Their ship is busy surveying off the Cuban coast when the wireless awakens to life as a radio comes in. A disturbance has broken out in a Central American port and the Amer-

Photo by Stebbins

A GUNBOAT ON THE GREAT LAKES

ON DUTY IN NEAR EASTERN WATERS

Courtesy of "Our Navy"

RIDING OUT A GALE

A GUNBOAT IN SAMOAN WATERS

ican Consul has appealed to Washington for a warship. The cornet goes whipping up aloft and a one-pounder barks out the call for all boats to make their way back to the gunboat. The boat falls sing as the boats are hooked on and hoisted in, and away steams the gunboat on her policeman duty, leaving the signal survey flags flying in the breeze.

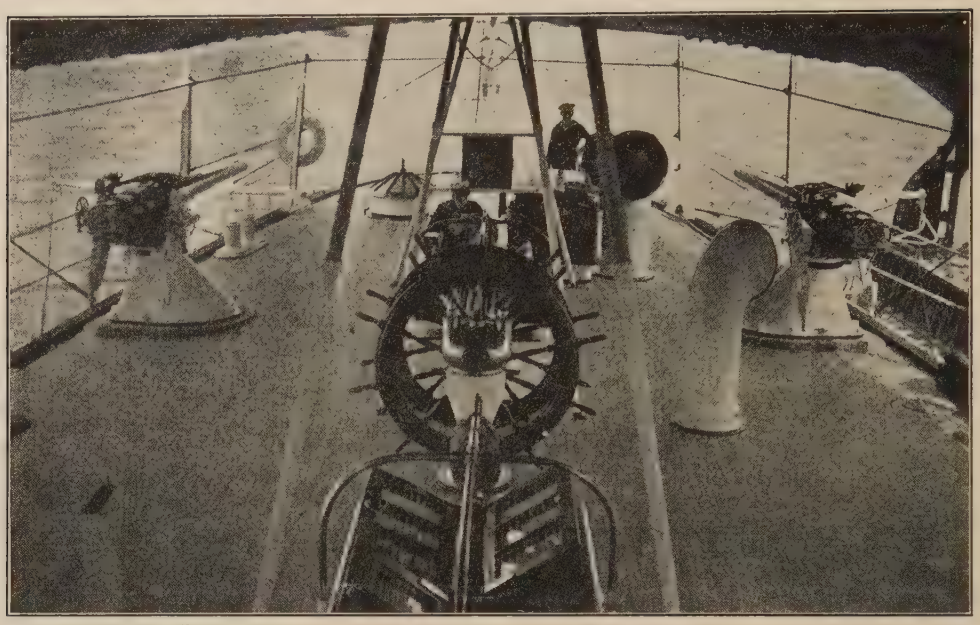
She makes the unruly port just in time to land a boat's crew of bluejackets and marines, ready for any emergency. The boat returns, and with it the gold from an American bank that has been threatened by a raid from revolutionists. Up anchor and down the coast to a secluded bay, where an ex-President boards her to seek an asylum from the firing squad or jail that awaits him should the revolutionists win the little war.

Sometimes the radio calls her to back up a customs officer in Haiti or Santo Domingo in his work of putting down smuggling. Or it may be to carry supplies to a battalion of marines who are holding a port to which no regular liners ply, or to land them for the seizure of some town where anarchy has broken out as a result of constant revolutions.

On the Asiatic Station, where the revolutions in China often put in danger the lives of all Americans and Europeans, the gunboat plays a great part, and has done so for generations. With her shallow draft she can reach points far up the rivers that empty into the sea. She has proved a needy refuge for missionaries of every nation and religion, and a rallying-point for all foreigners who had given up hope of aid from the outside world.

THE GUNBOAT LANDS A FORCE IN THE TROPICS

The majority of our gunboats are old ones, grown venerable in the picturesque service demanded of them. Many of those now carried on the Navy list as gunboats are of little value for these demands. They have been assigned to duty with the naval militia on both coasts and on the Great Lakes, and to other duties as station or school ships. When the Mexican troubles called for blockade duty or the hurrying of ships



Courtesy of "Our Navy"

THE QUARTERDECK OF THE U. S. S. "WILMINGTON"

to threatened quarters, it was necessary at times to take cruisers and destroyers away from their regular duties to do the work of gunboats. To remedy this situation we we built six gunboats of larger tonage, and have converted several sea-going yachts and tugs to carry on this vital duty. They have been designed for long service in the tropics, where ships' hulls foul more quickly and their equipment deteriorates faster than in the waters of a moderate climate.

The draft of gunboats is an important feature, for too much defeats their usefulness for river work. When we built two of them at the Mare Island Navy Yard a few years ago especially for work up the Yangste River in China—a hotbed of revolutionary outbreaks and of demonstrations against foreigners residing in China—the *Palos* and *Monocacy* were designed to draw but 29 inches. They were built in sections, transported to Hong Kong, and there assembled for their work up the Yangste. With a displacement of but 190 tons and this shallow draft, the *Palos* and the *Monocacy,* small as they are, are splendidly fitted for police work under the American flag.

Two of our most famous gunboats won their laurels in the East. The old side-wheeler *Monocacy,* which has handed down her Indian name to her Yangste successor, was for years one of the most familiar sights in Chinese waters. She burned wood, and was unwieldy as a

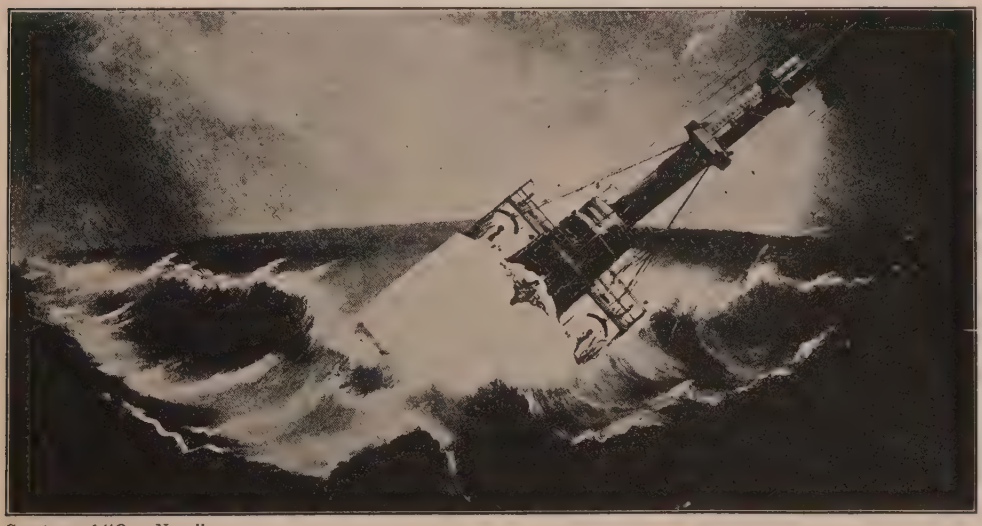
ferryboat, but did yeoman service even as late as the Boxer troubles in 1900.

In all, six shallow-draft gunboats normally constitute the adventurous Yangtze River Patrol for duty far up in that turbulent area of China. The *Callao, Don Juan de Austria, Elcano, Isla de Luzon, Pampanga, Quiros, Sandoval, Samar,* and the *Villalobos* once flew the flag of Spain, for they were captured from the Spaniards at Santiago or Manila Bay. The *Villalobos* proved too much of a name for Yankee tars, so they have rechristened her the "Village Hobo."

The latest of our Policemen of the Seas now carry as their armament three 4-inch, two 3-pounders, two 1-pounders, four machine guns, and two 3-inch field pieces for landing parties.

Because of their small size none of our gunboats carries more than 150 men.

Though seaworthy, they are great rollers in a sea-way; but to make up for that discomfort, the men who make their homes for a cruise on a gunboat do not lack for excitement and variety of duty. They penetrate into many strange and interesting ports which the Fleet never makes, and they bring home tales that are retold in the Fleet with envy.



Courtesy of "Our Navy"

U. S. S. "WILMINGTON" IN A TYPHOON

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A GIANT SIDE-WHEEL PASSENGER STEAMER ON THE GREAT LAKES

VIII

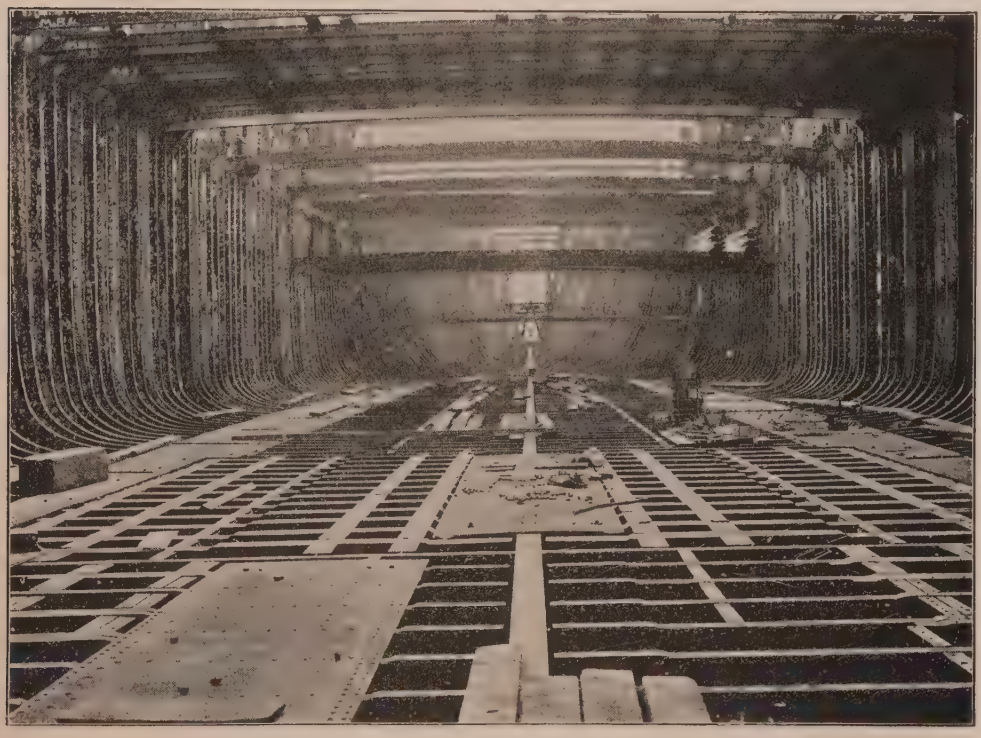
THE LINER IS A LADY

IT is but little more than a full century since the first steam-driven craft, Fulton's little *Clermont,* churned the waters of the Hudson. In that century steamships have girdled the globe and made it a golden era. Within their wooden, iron, or steel hulls they have housed every great step that science has made in that century; and Americans have played their part with the other nations. Eleven years after the *Clermont* had proved the value of steam as a propulsion for vessels the first steamship crossed the Atlantic, and at her taffrail flew the American flag. Wealthy citizens of Savannah built the side-wheeler *Savannah,* and in 1818 she crossed from Savannah to Liverpool in twenty days.

Paddle wheels gave way to the screw propeller in 1850, just two years after the United States had begun to compete with Great Britain for the Atlantic steamship trade. It was at this time that the *City of Washington* and the *Britannia,* of the Cunard Line, raced from New York on the same day, amid scenes of great excitement. The *Britannia* made Liverpool two days before the *City of Washington* reached Southampton, and that two-day margin chilled further

THE AQUITANIA (Cunard Line)

enterprise until the Collins Line, founded in 1850, was aided by a yearly subsidy of nearly $1,000,000. With the *Arctic, Atlantic, Baltic,* and *Pacific*—fleet ships for those days—the new line swept the sea as the American clipper ships had, for they were too speedy for the Cunarders, then the pick of British liners. A series of disaster befell the Collins Line after four years of supremacy. First the *Arctic* was lost in a collision at sea. Six months later the *Pacific* sailed from port and was never heard from again. In the face of these heavy losses,



THE HULL OF A MODERN LINER AND BANANA CARRIER

in which many lives were sacrificed, the Government withdrew its subsidy. In 1858 the Collins Line became only a memory, long since forgotten, of its proud position on the sea.

Once again the Cunarders ruled the waves, and then followed the thrilling race for steamships of greater speed and greater tonnage, in which Great Britain and Germany were the rivals. A new ocean greyhound would be laid down on the Clyde, only to be eclipsed by a product of the German yards. A few years later its title would be wrested away. One German leviathan that failed to show the speed contracted for lay idle at the Hamburg docks for fifteen years before

she took a humble place in the overseas competition. When the World War began in 1914, many of the fastest and biggest German liners were held by their owners in neutral ports to save them from capture on the high seas, and the best of the British greyhounds were converted into auxiliary cruisers and transports.

When the war broke, the climax in ocean liners had almost been reached by Germany in the *Vaterland*. She was lying at the Hamburg-American docks in Hoboken, and there she was held. The thousand-foot ship had long been the vision of ship-builders, and the *Vaterland* came close to that vision. She was but fifty feet short of it in length, with the tremendous tonnage of 58,000, and carried a crew of 1,200 men and women to care for the 4,100 cabin and steerage passengers for which she was designed. In tonnage she trebled the biggest steamship of the decade before, was half again as long, and raced through the sea at a speed of more than 23 knots.

Fastest of all ocean liners are the giants *Mauretania, Aquitania* and *Berengaria* of the Cunard Line, and the *Majestic* of the White Star Line. The fastest transatlantic voyage ever made was by the *Mauretania* at an average speed of 26.6 knots. She has made as high as 676 knots in one day, and in a short-distance spurt raced through the sea at the rate of 27.47 knots an hour. The others are close on her heels, and in an unofficial run the *Aquitania* has made a spurt of 16 knots at the rate of 33.1 knots per hour.

Of the American translantic liners the *Leviathan,* once the German liner *Vaterland,* leads with an official speed of 23 knots, while the *George Washington* and the *America* are credited with 19 and 17 knots respectively. None of the liners in active service sustain these high rates of speed, for a sustained speed of approximately 22 knots an hour, or even less, is considered as the efficient speed for the long trans-Atlantic trip.

The *Leviathan,* which attained a speed of 28.04 knots an hour on her trial trip, is aptly named, for she is the largest liner afloat with her tonnage of 59,957, which is 3000 tons greater than her nearest rival. In length she is 906 feet, with quadruple turbine engines driving four propellers. When the *Vaterland* was in the United States at the outbreak of the war, and interned in accordance with international law, she lay for months at her Hoboken dock. With our entry into the war she was seized by our Navy, to be put into commission as a giant troopship. The boarding party found that the German crew had deliberately damaged certain parts of her machinery. The repairs were rushed through, however, and the newly christened *Leviathan* per-

formed invaluable service in the transport of troops and supplies to France. Puny in comparison to her huge bulk are the next two largest liners that fly the American flag, the *George Washington* and the *America,* with tonnages of 23,788 and 21,144 respectively.

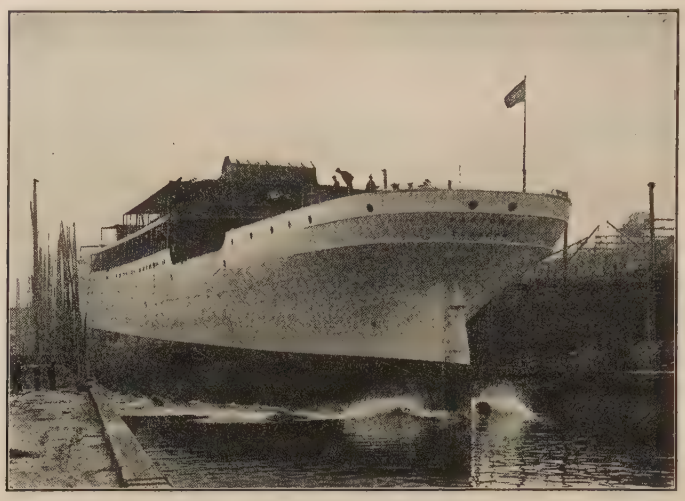
The great ocean liners are equipped with every form of luxury that is possible at sea. Each has its refrigerating and electric plants, telephone system, grill, private dining rooms, conservatory and lux-

A TYPICAL 535-FOOT PASSENGER LINER

urious suites. The larders are stocked with every delicacy and there is an army of servants to answer all demands. The radio not only adds to the safety of the passengers but brings to them the news of the world. For recreation the passenger can turn from the games of ship-board life to a well-stocked library, the swimming pool and the gymnasium. The modern liner is indeed a floating palace.

The traffic of the Great Lakes is one of peculiar interest to all Americans. Not only in its great volume of freight-carrying trade, but in its passenger ships, their deepsea rivals have but little in speed and accommodation that is superior. Here we find the largest fresh-water steamships in the world. Heading the fleet are the twin ships, the *Greater Buffalo* and the *Greater Detroit,* which enjoy the distinction of being the largest ships in the world that are operated by paddle wheels.

Side feathering paddles, 30 feet in diameter, drive them through the waterways of the Great Lakes at a speed of 21 knots. They are 535 feet overall and their tonnage is 7,739. In the number of rooms for the accommodation of passengers each of them can boast 79 more



THE "PASTORES" JOINS THE GREAT WHITE FLEET

rooms than the great *Leviathan,* and their total passenger accommodation is 1700, with space for the crew of 300 in addition. A unique feature of these paddle-steamers is a bow rudder which facilitates their handling in narrow waters.

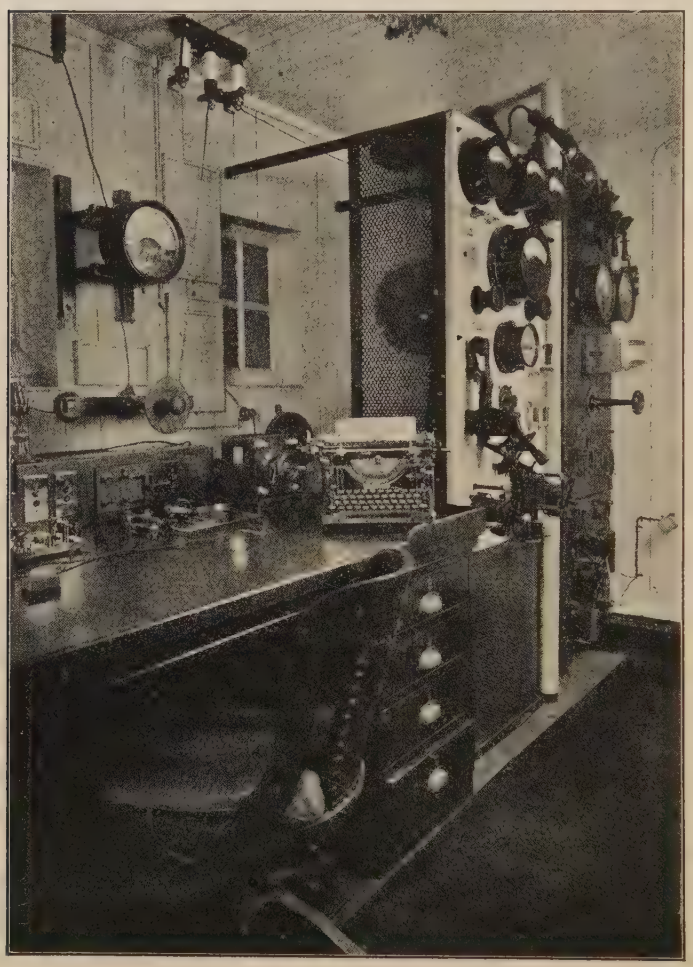
At night the passenger and excursion steamers, blazing with light, and the lights of the freighters and barges, combine to make the lakes the Great White Waterway of the world. When winter comes and seals the lake with ice, and combs it with furious gales, the immense passenger fleet ties up at the docks in mile-long lines, waiting patiently for the opening of navigation in the spring.

Out on the Pacific Coast fourteen world-known American passenger and freight-carrying lines, little inferior to the trans-Atlantic fleet, operate to Alaska, the Orient, South and Central America, Hawaii, the South Seas and on excursions that belt the globe.

THE PROMENADE DECK OF AN AMERICAN LINER

A SHIP OF THE GREAT WHITE FLEET

The *Presidents* of the Dollar Line, which operate around the world, and the *City of Los Angeles,* of the Los Angeles Steamship Company, are the largest of this western Armada. The *Presidents* have a tonnage of 14,000, a speed of 18 knots, and there are few ports of the world that have not sheltered them. *The H. F. Alexander,* with a tonnage of 8,357, is the fleetest, with its 23-knot speed.



RADIO ROOM OF THE S.S. "PASTORES"

On the Atlantic Coast four independent lines, and nineteen United States Shipping Board lines engage in trans-Atlantic service, carrying the American flag to all the Seven Seas. Besides this fleet are others operating on the Atlantic Coast, of which the speediest is the *Boston,* with 19 knots; and those that run between the Atlantic seaboard of the United States and the Central and South American ports.

Eighteen American lines engage in the Caribbean trade alone, comfortable, moderate in speed, and colorful in their service. Winter cruises to the West Indies and Central America have become deservedly popular, for this region is aptly named the American Mediterranean. Their routes were once traversed only by warring frigates,

HOUSE FLAGS AND FUNNELS OF

THE PRINCIPAL STEAMSHIP LINES

privateersmen, buccaneers and the adventurers of the Old World. There is no more picturesque sea than this with its fringe of palm-lined shores that rest in blue tropical waters.

THE NAVY FURNISHES GUNS AND CREWS FOR THEIR DEFENSE IN WAR TIME

Photo by Stebbins

IX

SQUARE-RIGGERS AND FORE-AND-AFTERS

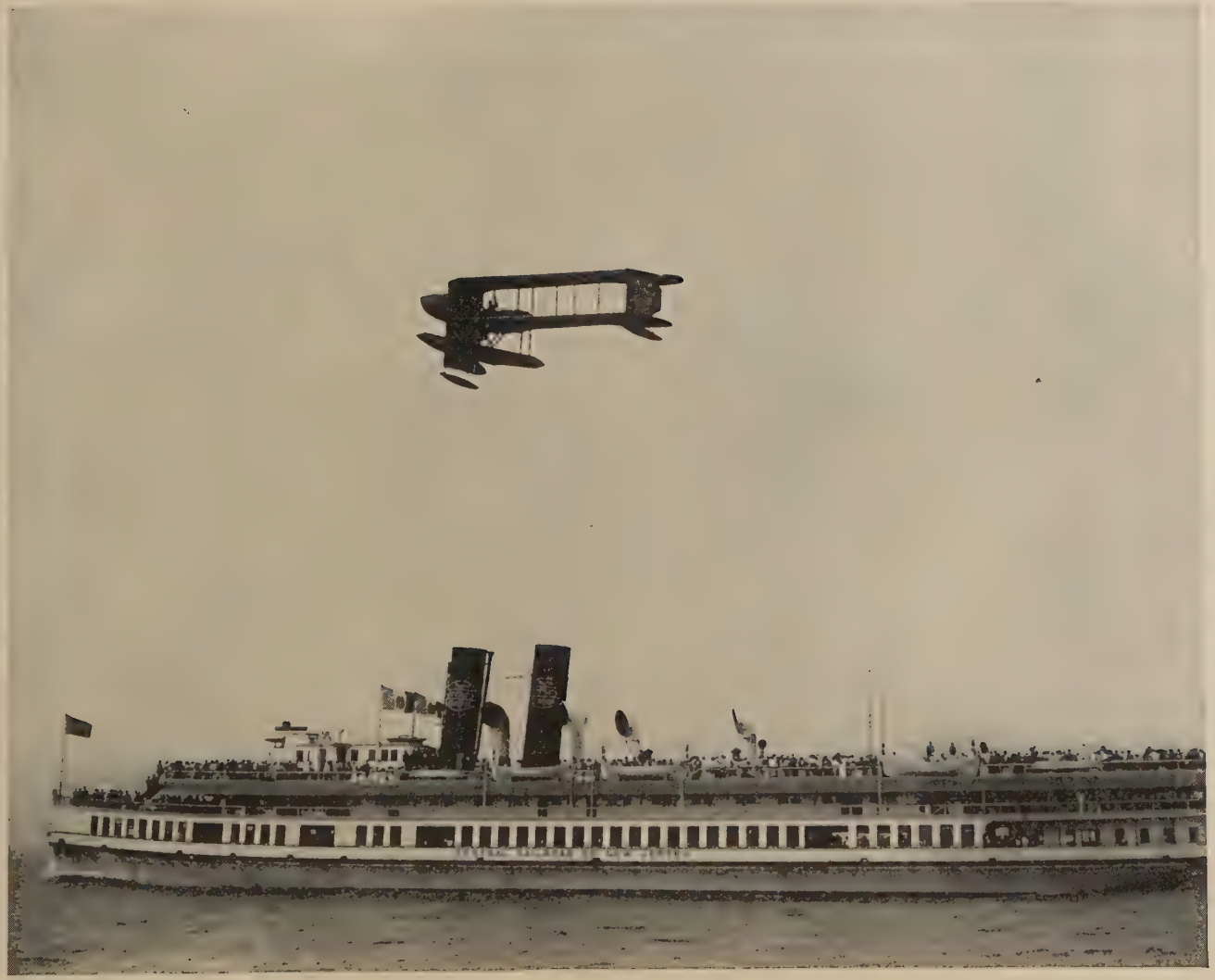
WHEN the United States was but a stripling among nations, and the world's ocean trade was carried in wooden bottoms, our flag was shown in every port. America ruled the waves in those days. No other craft could show its heels to one that carried Yankee topmasts. Of all the ships that sailed in blue water ours excelled in the beauty of their lines, in the cloud of white canvas that was stretched on tapering spars, and in their record-breaking runs around Cape Good Hope with holds laden with the teas, silks and spices of the Far East or in the rounding of the Horn.

There were many reasons that won us the supremacy of the seas, which we wrested from Great Britain only to see it pass back to her. Back in the days of the colonies Americans took to the seas as a natural calling. Our shores were rich with timber and our waters teemed with fish. The sea held out rich rewards and the colonists were a hardy lot for whom its hardships and risks held no terrors.

It is a curious coincidence that in the year 1607, when the first permanent settlement was made in this country, the first American vessel built for commercial enterprise was launched, and to her was given the name of that settlement, *Virginia*. Built at the mouth of the Kennebec River, this 30-ton pinnace crossed the Atlantic safely and returned to join the fishing vessels of Europe on the Newfoundland Banks, sharing with them the dangers of drifting ice, black fogs, and wild gales. Others followed, and our colonial fishermen led the fishing

Courtesy of "Flying"

AN OCEAN GREYHOUND MAKING PORT



Courtesy of "Flying"

A RIVER STEAMBOAT

Photo by Stebbins

THE AMERICAN CLIPPER SHIP

Photo by Stebbins

THE FULL RIGGED SHIP "VOLAGE"

fleet in sea skill and daring. To-day the Gloucester fishermen hold up their traditions in gallant fashion.

Their rich profits tempted still more, and the ports of Salem and Marblehead grew until their shipyards were never idle and their waters were lively with the coming and going of a forest of masts. The colonists were fast gaining the "sea habit." Even those who did not follow the sea regularly for a livelihood, preferring the tilling of the soil, knew how to "hand reef or steer."

Photo by Stebbins

THE EAST INDIAMAN "PANAY" SETS OUT FROM SALEM

The first of these vessels carried three masts: two fitted with square sails, while on the third was a long, slender yard that spread a lateen sail fore and aft. Underneath the end of the rakish bowsprit a square sail was also spread on a yard. The ketch supplanted this, the one small and one large mast, fitted with yards, being easier to handle with a smaller crew. Then came the "snow," a modified brig, two masts with crossed yards as on a ship, with a slender mast abaft the main for a fore-and-aft sail. The sloop was the next to win favor, with its fore-and-aft four-cornered sail and jib, which still survives in yachts and oyster boats, for it

gave then as well as now the greatest speed in proportion to its canvas and called for the smallest crew.

The coming of the schooner was a natural step and its story is an interesting one. Gloucester saw its first launching in 1713, and when the news went abroad that this two-masted fore-and-after was to be launched with her sails stretched a large crowd gathered. When she took the water the swift, graceful motion of the hull gliding out into the stream brought from one admirer the shout: "Oh, how she scoons!" The quick-witted designer answered, "A scooner let her be!"

Except for the launching of Robert Fulton's steamer *Clermont* in 1807, the invention of the schooner was the most important event that ever transpired in American shipyards, for its economical and handy rig soon absorbed the coastwise trade of the country. From the first schooner the type developed until it reached its climax in the seven-master *Thomas W. Lawson.*

The growth of the colonial merchant marine was spurred on by three curious trades—smuggling, privateering, and slaving. They laid the foundation which led to the brilliant climax that came in the golden days of the Yankee clipper ship. The unfair navigation laws enforced on the colonies by Great Britain led to the smuggling trade, for the colonists did not submit tamely to them. Their fast ships had little trouble in evading the King's cutters, for the ships laid down were built with an eye both to speed and to carrying capacity.

To the royal returns to be won from the sea on the fishing banks, in the growing whale fisheries, with Nantucket and New Bedford as the rendezvous of the whalers, and in smuggling, were next added those of the slave trade. In those days "black-birding," as it was called, was not considered an unjust practice. Its profits lay in quick runs, and here again the combination of speed and capacity helped lay the foundations of many a solid fortune for a God-fearing people.

It is easy to see that with this activity at sea there grew up a hardy brood of sailormen second to none. Some even yielded to the lure of a pirate's adventurous career, with its promise of fat prizes, the excitement of the chase, and its hand-to-hand fights between the crews of honest merchantmen and those who sailed and fought under the Jolly Roger.

They made Madagascar Island a headquarters, and here the notorious Captain Kidd sailed in a private armed ship, American manned, to rob them of their stolen wealth. A mutiny broke out on his ship, the *Adventure Galley,* and in quelling it Kidd struck a muti-

Photo by Stebbins

THE "TIMANDRA" IN A WHOLE-SAIL BREEZE

Photo by Stebbins

THE BARK "KENNARD" FLIES HER CODE NUMBER

neer with a bucket and killed him. He found the pirates at Madagascar Island too strong for him to attack, and so he set sail for his home port with a ship that he captured on the high seas. In the meantime he had been branded as a pirate and on his return was hanged. Held up as one of the greatest of pirates, Captain Kidd could boast of only one captured prize and a sea brawl in which he killed his man with a bucket.

When the colonists threw off the yoke of the British in 1776, their merchant marine, in both ships and men, was a threat to be reckoned with. It had won its share of commerce, and our Yankee tars and Yankee ships showed brilliantly throughout the war. The deeds of our privateersmen in the War of the American Revolution stand high in the annals of the sea.

Most noted of the privateersmen was the brig *General Armstrong,* commanded by Captain Samuel G. Reid. Three British warships, en route with reënforcements for the British besieging New Orleans, attacked her at anchor in the harbor of Fayal, in the Azores, in September, 1814. After a spirited all day and night battle her brave crew drove off the British with heavy losses. Captain Reid then scuttled and abandoned her and fortified himself ashore. The British gave up the fight, but the delay of a week in burying their dead and making repairs proved fatal to their original errand. When they arrived off New Orleans, General Jackson had defeated the British in the most brilliant success of the War of 1812.

The heavily armed British men-o'-war were no match for our privateersmen in speed or seamanship, and their merchantmen were helpless against their swift raids.

The officers and crews laid the foundation for the American Navy, and it was small wonder that with such stock to draw from we were able to humble the Barbary pirates, and, though we lost heavily at sea in the War of 1812, our frigates and armed merchantmen at least won the right for an American ship to sail the high seas unmolested.

The close of the War of the Revolution left our sea-carrying trade crippled, for peace saw but one-quarter of the cargoes that came and went from American ports. Wise legislation begun by George Washington to aid ships built and owned by Americans soon remedied this. The merchant marine grew by leaps and bounds. One hundred years ago our foreign commerce was almost as great as it was before the European War of 1914 revived our overseas trade.

With this remarkable growth men turned again to shipping. From the yards on the New England coast were launched craft that excelled

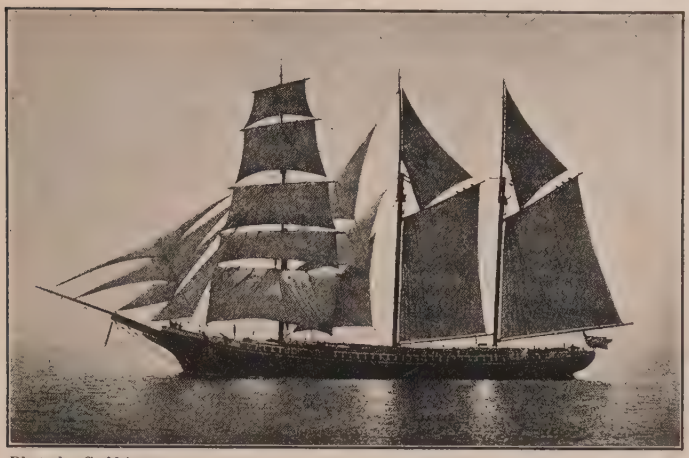


Photo by Stebbins

THE BARKENTINE "RACHEL EMERY"

in speed and capacity, a combination that no foreign sea power could equal. It was even more supreme in the smartness and seamanship of the men who manned those wonderful ships. Their officers were men of education and family as well as daring, shrewd traders who were pioneers in new trade routes. They combed the seas for rich cargoes, and showed their topsails in port far ahead of any foreign rivals.

Then came the design of the Baltimore clippers, which swept the sea with their remarkable qualities when the first was turned out from a Chesapeake shipyard. With their light draft, great breadth of beam, clipper bows, and great spread of sail, they could walk away from any other craft afloat. Their cabins were fitted with rare woods, their bows with carved figureheads, and no ships could close the gap between their richly carved and gilded sterns. Their skippers scorned to take in their light sails when more timid seafaring men showed bare topmasts. They delighted in carrying full sail and driving their ships in the face of a howling gale. But they knew that under their feet was the best of timber, that

Photo by Stebbins

THE BRIGANTINE "RAPID TRANSIT" ON STARBOARD TACK

overhead the slim spars were equal to the gale, and that their crews were picked men. Constant vigilance was hand in hand with their daring. The sea had come to them as a heritage.

Photo by Stebbins

THE "FRANK BARNETT" IS A TYPICAL COASTING SCHOONER

It was in the ten-year period beginning with 1847 that the clippers held their greatest sway. Then came the rush of gold-hunters to California by the deep-sea route around Cape Horn; the great Irish famine created unusual demands for foodstuffs that Europe could not supply; and the East Indian trade was at its height. In one year of that period alone more than a half-million of tonnage was added to the American merchant marine.

The clipper ships bore brave names in those days when seafaring men had not been sobered by the prosaic influences that came in with the era of steam. *Westward Ho*, *Sovereign of the Seas*, the *Flying Cloud*, the *Comet*, the *Lightning* and the *Dreadnaught* were the leaders of the clipper fleet. Queen of them all was the *Dreadnaught*, commanded by Captain Samuel Samuels of

Courtesy of "Our Navy"

A BALD-HEADED SCHOONER

the American merchant marine. The sailors called her "the Wild Boat of the Atlantic" after she hung up her record of 9 days and 17 hours in the 2,760-mile run from Sandy Hook to Queenstown; and the record holds good to-day for sailing craft. The *Flying Cloud* made the trip from New York to San Francisco in 89 days and 18 hours; on one run of 24 hours she made the astonishing distance of 427 miles.

Photo by Stebbins

THE SIX-MASTED SCHOONER "GEORGE W. WELLS"

The *Sovereign of the Seas,* another of those miracle craft, logged even seven miles more on her fastest day. When the *Lightning* left England for Calcutta with troops she made the Indian port sixteen days before any other of the troopers, while some of them dropped anchor full forty days behind her.

The end of that romantic period saw a steady decline. Iron was beginning to supplant wood for shipbuilding. The great advantage we had held in our limitless forests fell before the greater output of iron that Great Britain enjoyed. Congress wiped out the subsidies that

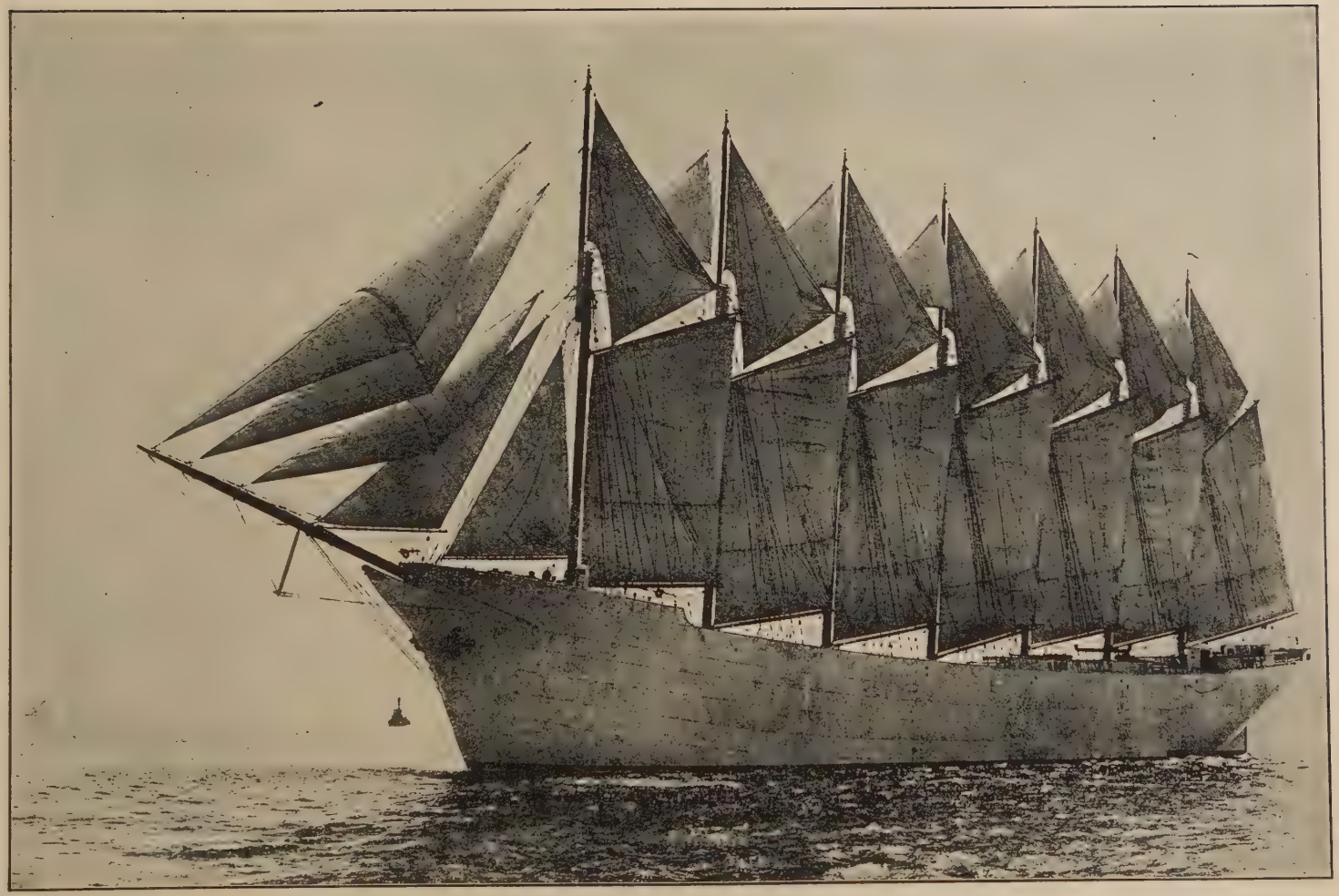


Photo by Stevens

THE SEVEN-MASTED "THOMAS W. LAWSON" WAS LOST AT SEA ON FRIDAY THE THIRTEENTH

George Washington had begun, and when the Civil War was ended our ships numbered but half their proud strength.

Confederate privateersmen, notably the *Alabama,* had taken heavy toll, for our ships were built and owned largely in the North. A great part of the merchant fleet had gone under the neutral protection of the British flag, and the needs of the fighting forces had converted many into ships of war or auxiliaries. It was cheaper to build and man foreign ships, and famous old clippers were dismantled to do duty as coal barges up and down the coast.

Courtesy of "Yachting"

THE HIGHEST TYPE OF SLOOP

Low-water mark was sounded by our shipping in 1898, when American bottoms carried less than ten per cent. of our trade. No longer did Yankee ships venture out into blue water to show their masts in every corner of the world. In some great ports the American flag was not seen from one year's end to another, unless it flew over the decks of a man-o'-war or private yacht. American crews were almost unknown, and our forecastles were filled with seafaring men of alien birth. Only the schooners held their own in the coastwise trade, and it was then that the famous *Thomas W. Lawson* was launched. She was soon the talk of the seas, and sailormen were hard put to it to find names for all of her seven masts. Some compromised by naming them from bow to stern after the days of the week, beginning with Sunday. Others gave them the truly nautical names of forecastle-mast, foremast, mainmast, mizzenmast, jiggermast, spanker- or driver-mast, and aftermast. Her sails were lowered and hoisted with donkey engines, and a small crew handled her with her tons of cargo. Her

career was ended when she went ashore at night near the Needles in the English Channel.

Only the Gloucester fishermen and the blue ribbon ninety-foot sloops that defended the America's Cup from foreign challengers upheld the memories of the old days.

There is no more distinctive Yankee craft than the fishing schooner of Gloucester. Her lines are those of the clipper and her sails rival those of a yacht. Starting from port with only a lead-line, chart, and compass, these modern Vikings stay out for weeks. The Grand Banks off Newfoundland and the George's off Cape Cod are their usual fishing-grounds, but many make their way to the fishing-grounds off Norway. They carry their dories nested on deck, and all but the captain and the cook take to them, two men to a dory, when the fishing-grounds are reached. Their lines, which they call trawls, are run out, buoyed and anchored at one end, and when the end of the trawl is reached they go back and haul in. Captain and cook jog along, picking up the string of dories at the end of the day's fishing.

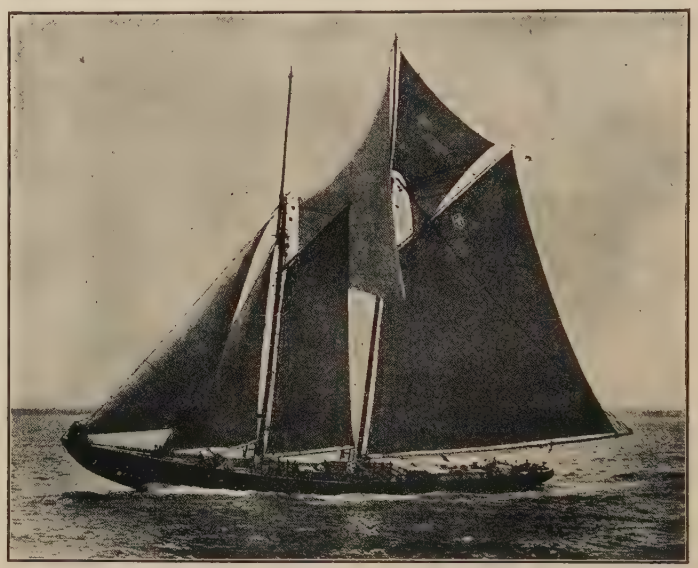


Photo by Stebbins

THE GLOUCESTER FISHERMAN "HELEN B. THOMAS"

Then comes the race to port, when the schooner's hold is filled with her catch iced down for the market. Every bit of sail is made, and with skillful seamanship the fleet races home, the winners benefiting by the higher profits that await the first arrivals. The Grand Banks fishing-ground lies near the transatlantic route, and Kipling, in his "Captains Courageous," immortalized the risks that the plucky fishermen run when a great liner comes slicing through the fog. Many a Gloucester schooner made port with a man or so missing from the crew of twenty when it was necessary to send men out on the bowsprit to handle her headsails. Handicapped with sea-boots and heavy clothes,

they had lost their hold in rough weather. But progress, which can hardly improve on the racing lines and the big spread of canvas which these doughty fishermen have put into their schooners, has given the modern schooner the safer knockabout bow and so has robbed the sea of many victims. The new ones also carry auxiliary power, which makes them independent of calms and light airs.

A GREAT LAKES EXPRESS CRUISER IN ACTION

X

MOTORBOATS FOR FUN OR WAR

THE love of speed is truly an American trait; and the fact that in the motorboat *Miss America II* we have the fastest craft in the world accounts in part for the hold that motorboating has on Americans. But the thrill of speeding through the water at the rate of a fast express-train is not the only one that has drawn thousands to this recreation. In every section of the country where the sport is possible a new fleet takes the water every year. They are of all types, from the racing hydroplanes to the little runabouts, and the range of craft that may be classed as motorboats takes in new models yearly. Some are built for bursts of speed and others cruise well out of sight of land.

Not satisfied with the protection of harbors or secluded waters, a 35-foot motorboat, the *Detroit,* even crossed the Atlantic under her own power and logged 6,000 miles before she came to rest in a great Russian port.

The World War even more strongly emphasized the truth

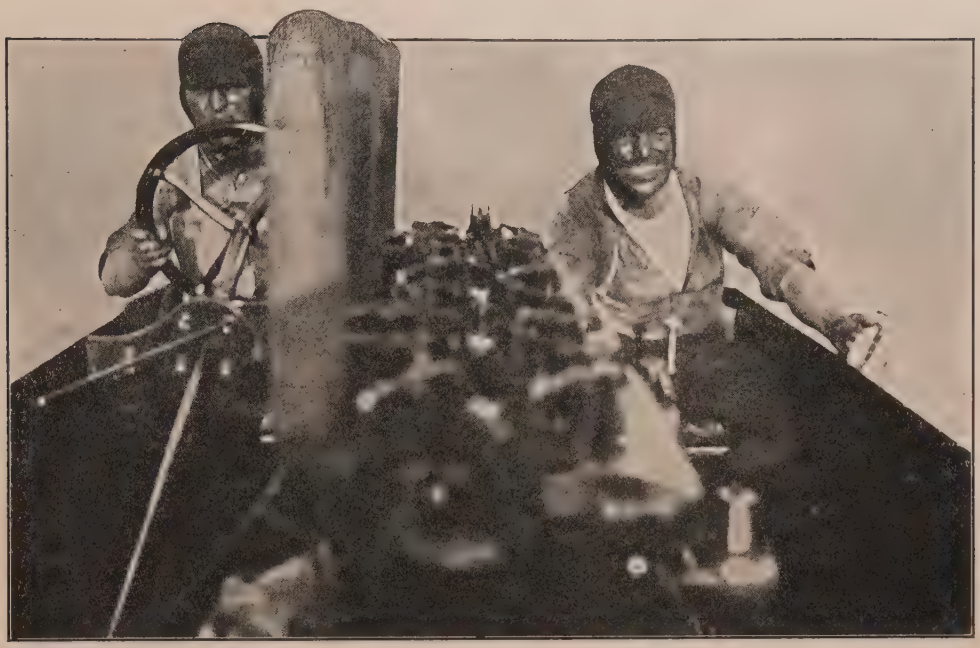


Photo by Wm. Washburn Nutting

THE CREW OF THE MILE-A-MINUTE BOAT

that what we first looked upon as a fragile and expensive toy has but little limit to its usefulness. American-built motorboats won their way in that greatest of wars to rank as a useful part of the modern fleet.

When motorboating began it was the sport of wealthy men. To-day it is within the power of any one with a skiff or rowboat to join the great armada by simply attaching to its stern an outboard motor at an outlay of fifty dollars.

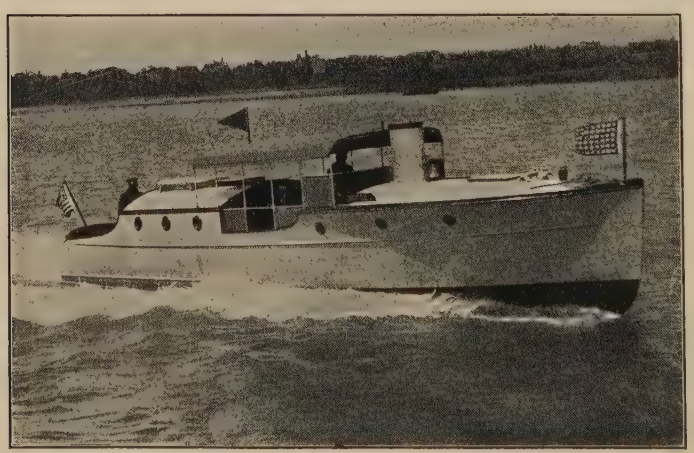
MAKING AN S-TURN IN MIAMI RACES

Fastest of all types is the hydroplane. One great stride in the design of the hull, and the advance in

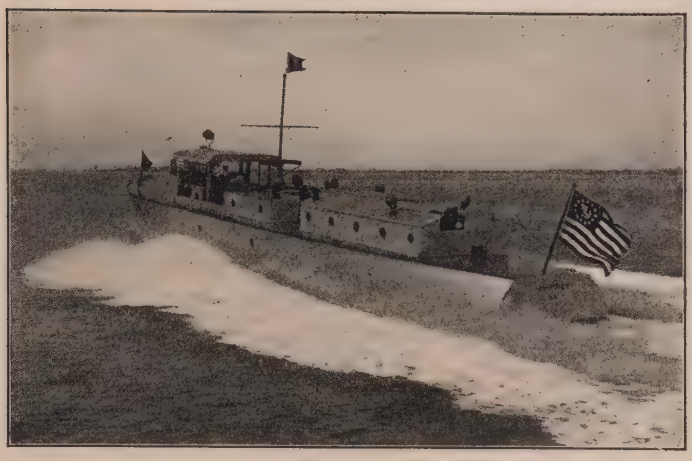
high-powered motor engines made the old dream of the mile-a-minute boat come true in *Miss Minneapolis*. Her designer, C. C. Smith, of Algonac, Michigan, first took as his model what would seem to the novice a watermelon seed. After its speed had been proved there came greater improvement; but the hydroplanes were far from comfortable with the spray dashing over them, and they were hard to hold on a straight course. They settled deep at the stern and flew over the water in a series of flops or jumps. The fascination of their speed was keen and the new type made hydroplane racing the rage.

THE "DETROIT" CROSSED THE OCEAN

Then came still another change in the design of the hull, and this sent the hydroplane skimming over the surface like a fleet waterfowl. It was the V-bottom idea introduced by a leading designer, William J. Hand, Jr. The V-bottom, when the boat is underway, lifts it bodily, cutting down both the resistance of the hull and the friction of the water. It is a seaworthy type too, for it throws the water away from the hull, and the faster the boat is driven the more stable it is. Not only did it give the hydroplane its in-



FORTY FEET OF SPEED ON THE GREAT LAKES



THE "WHIPPET" IS AS SPEEDY AS ITS NAME

creased speed but with the V-bottom heavy, staunch boats can be driven at great speed: a speed that hitherto had been realized only in narrow-beamed, unseaworthy, and uncomfortable craft.

Soon after the V-bottom brought the racing hydroplane to the high-water mark of speed *Miss Minneapolis* flashed through the motorboat world like a meteor. *"Miss Minnie,"* as she is affectionately known, was built for the city of Minneapolis to wrest away from Detroit the famous Gold Challenge Cup. In 1915 *Miss Detroit,* built by a syndicate of prominent Detroiters to compete for the Gold Challenge Cup, won from all competitors. Minneapolis took a leaf out of Detroit's book and a syndicate built a motorboat and named her *Miss Minneapolis.* The race of 1916 was a great event with *Miss Detroit* and *Miss Minneapolis* fighting for the honors of their respective cities. Over six one-mile trials they measured their speed, and *"Miss Minnie"* proved the faster boat, with an average of 61.08 miles an hour —a new world's record for craft of any kind. She is only twenty feet in length and not quite one-third of that in beam, but her 250 horsepower motor on the

Photo by J. Loring Swasey

MILITARY PATROL BOATS MANEUVERING

fastest of her six trials drove her at the astonishing speed of 63.5 miles.

While the war checked the progress of motor boating it is now enjoying its greatest popularity. Hydroplanes are by far the fastest types known for the peculiar construction of their bottoms, made with one or more notches or steps so that they ride on cushions of air, makes them so.

Fastest of all hydroplanes and therefore the fastest boat in the world, is *Miss America II,* owned by Commodore Garfield A. Wood, of the Detroit Yacht Club. Her official record is 80.567 miles per hour, which was her average speed in six one-mile trials made at the One-Mile Championship of America race of the American Power Boat Association, September 6, 1921, at the Detroit Yacht Club.

Miss America II is 32 feet long with an 8 feet, 9-inch beam, and she is driven through the water by four Wood rebuilt Liberty engines that total 1,800 horse-power.

Ranking with the record-breaking performance of *Miss America II* is the remarkable trip of the motorboat *Detroit*—which should not be confused with *Miss Detroit*—from the city of her birth to Petrograd. The *Detroit* and her plucky crew, Captain Thomas Fleming Day and four men, made her way by lake and canal from Detroit to deep water. From New Rochelle she started on her cruise across the Atlantic on July 14, 1912, and arrived at Queenstown, Ireland, twenty-four days later. All the way she was buffeted by wind and sea, as her battered hull and fittings showed to the wondering people of the Irish port. Only once in that long run did her Scripps motor stop, a tribute to the advance in motors that has kept pace with the advance in design.

For twenty-one days of that long leg of her cruise the *Detroit* was out of sight of land, logging an average rate of six and one-half miles an hour under unfavorable conditions. In her tanks she carried 1,200 gallons of gasoline. From Queenstown the *Detroit* sallied forth to show her flag in the English port of Southhampton, thence to the Dutch port of Amsterdam. Up the Baltic Sea to Petrograd, or St. Petersburgh as it was then called, the 35-foot motorboat had a triumphal procession. Her arrival at the end of her 6,000-mile cruise was the occasion of great enthusiasm and official celebrations in honor of the sturdy little Yankee craft and her crew.

Ranking next in importance to the hydroplane is the express cruiser, not so fast, but designed for fast cruising, and with luxurious quarters for its crew. *Gar, Jr.,* also owned by Commodore Wood, holds the palm in this class for speed. Her best performance is 44-miles an

AN ATLANTIC COAST EXPRESS CRUISER

hour, approximately ten more than the fastest cruiser or destroyer of the Navy. She is 50-feet long with an 11-foot beam, and her power consists of two Wood rebuilt Liberty engines, totaling 900 horsepower.

THE 70-FOOT CRUISER "SYLVIA"

THREE 36-FOOT PACIFIC COAST CRUISERS

The history of motorboats is one of development; for even as the express cruiser is the development of the hydroplane and the runabout, the great success of the express cruiser led in 1916 to a squadron designed for coast patrol boats and submarine chasers.

When we entered the World War in 1918 patriotic citizens organized a power boat auxiliary force, and the Navy was not slow to recognize its value for coastal patrol and the hunting of submarines. This squadron rapidly expanded into a fleet and the power boats on this duty were quickly christened submarine chasers. To-day the Navy has approximately 100 of both the Eagle type and the Sub-chasers, ranging from 75 to 500 tons displacement, with the heaviest guns 3 and 4-inch, and an average speed of 17 knots, and a cruising radius as high as 3600 knots when steaming at the speed of 10 knots.

During the war they hunted submarines in suspected areas and with their listening devices were able to locate them. Once they had their prey they dropped depth bombs on them. Out in the Adriatic a squadron gave

THE "CHINGACHGOOK" BOWS ON

A SPEEDBOAT RACE

magnificent service in clearing those waters of enemy submarines, but their most daring exploit was in the attack on Durazzo, where they fought with the British and Italian warships that stormed that enemy base. Three submarines fell prey to their depth charges; they sunk floating mines with their gunfire, and piloted British destroyers safely past other mines.

Photo by Morris Rosenfeld, N. Y.

"MISS AMERICA II" IS THE FASTEST BOAT IN THE WORLD

From the Plymouth base in England another squadron carried out similar work. In one attack they damaged three submarines and the submarines and mere vigilant patrol of these little fighters warned enemy undersea craft away until the submarine activity in the chan-

THE "HALCYON" RECALLED THE OLD SPANISH CARAVELS

nel dwindled to nothing. In all 120 chasers crossed the Atlantic for duty in the war zone.

Even the old, barge-shaped house-boats, beautiful within but

Photo by Rosenfeld, N. Y.

"GAR, JR., II" IS ONE OF THE FASTEST EXPRESS CRUISERS

homely as an ark without, have caught the speed-fever. Their owners are no longer content with their leisurely speed, and new ones are being built every year with beautiful lines and greater speed without any loss of comfort. The most original of them all, as picturesque as the old Spanish caravel after which it is modeled, and as luxurious as it is beautiful, is Henry A. Morss' *Halcyon.*

Commodore Bourne, a leading yachtman, had on the St. Lawrence a gondola that needs no Venetian gondolier with long sweep, for it is in reality a motorboat designed by an American builder.

The sea-sled is still another startling type of motorboat that is of purely American origin, and, as Al-

A SUB-CHASER ON PATROL

bert Hickman of Boston is its father, it is generally known as the Hickman sea-sled. It is scowlike, with its sides flat and straight, wider at the bow than at the stern. In rough weather the sea-sled is incomparable both as to speed and as to dryness. A V-shaped opening in the bow collects the spray and carries it along its length under the bottom instead of throwing it on deck. Air is also collected at the same time, and the sea-sled rides on a cushion of mixed air and water. Four propellers work in pairs, one to the right and one to the left, and out from the stern flies a wake of white water. Both for fun and for war the sea-sled offers great possibilities, and the Navy has shown practical interest in its use as a patrol craft.

Submarine chasers have come into great prominence since the beginning of the war for the purpose of patrol and offensive work against submarines. These boats are driven by gasoline motors, the original design being about 80 feet in length. Practically all of this class were transported to Europe for the British and Russians.

On entering the war, the United States built a large number of these chasers 110 feet long, speed 16 knots. Part of these boats were turned over to the French and the remainder, several hundred in all, were operating either in the Mediterranean, or on the coast of France, England or the United States.

These chasers are very sea-worthy and carry a crew of about 15 men. They are organized in flotillas, which are called hunting groups. Each group is sub-divided into units of three boats which are provided with listening devices which can detect the noise of the submarine propellers when in motion. They search for enemy submarines, which when located are subjected to attack with depth charges. These depth charges consist of about 300 pounds of high explosive (trinitrotoluol) and are dropped over the stern or projected from the sides by Y-guns, which throw a charge out on each side simultaneously about 100 feet from the boat. The chaser must be making full speed when attacking, to prevent the depth charge from disabling it by the shock of discharge. These boats are also fitted with three-inch guns.

The latest type of submarine chaser is the Ford "Eagle" boat; these are 200 feet long and more powerful in every respect than the 110 footers. They can be used in hunting groups or for patrol and escort purposes, have a speed of 20 knots, and are in many respects equivalent to a small destroyer.

THE "AMERICA" IN THE RIG THAT FIRST WON THE CUP

XI

AMERICAN YACHTING

THE sailing yacht is the blue ribbon craft of the sea. The floating fortresses of the navies, the ocean greyhounds that link the principal seaports, the prosaic freighters that carry the overseas trade, yield her that honor without dispute. American yachts have never failed in the supremacy that was first won by the schooner yacht *America* in English waters in 1851. Since then a long line of schooner and sloop-rigged yachts has defeated the pick of the English yards in their vain effort to lift the historic America's Cup.

There have been other stirring races in which American yachts have uniformly shown their heels to the crack sloops, schooners, or yawls of foreign countries, both in ocean races and in regattas, and in purely American races in which old champions have had to bow

to a better boat, but the history of the American yacht is mainly that of the America's Cup series.

The America's Cup was first known as the Queen's Cup, a hundred-ounce silver cup offered by Queen Victoria in a free-for-all race off Cowes, England, on August 22, 1851. At this time the American flag, floating from the stern of swift clipper ships was preëminent on the sea, and the New York Yacht Club conceived the idea of sharing in the glory held by the clipper fleet. The World's Fair held in London that same year had attracted a great squadron of racing yachts to Cowes, and America was unrepresented. A syndicate subscribed the necessary money, and George Steers designed a schooner yacht along the lines that had made American pilot boats famous for their speed. In seventeen and a half days the *America* crossed the Atlantic to the French port of Havre and soon showed her prowess in victories over British yachts.

Courtesy of "Yachting"

THE AMERICA'S CUP

There were seventeen yachts in all that crossed the starting-line for the Queen's Cup. The course was around the Isle of Wight, and local knowledge of the currents and depths of the course were held to be almost as necessary as speed itself. The *America* bowled over the starting-line well in the rear at 10 o'clock on that historic morning, with her mainsail set to port and her foresail to starboard, "wing and wing." From the beginning she walked through the fleet and easily finished twenty minutes ahead of her nearest competitor. Some did not cross the finish-line until the next day.

It is told of Queen Victoria, then a young girl, that in the evening she called her sailing master, and asked him for news of the race.

"The *America* is first, Your Majesty," he answered.

"And the second?"

"Oh, Your Majesty, there is no second," was the reply of the sad salt.

The London *Punch* told the story in verse, as follows:

"Yankee Doodle had a craft,
A rather tidy clipper.
And he challenged, while they laughed,
The Britishers to whip her.
Their whole yacht squadron she outsped
And that on their own water;
Of all the lot she went ahead,
And they came nowhere after."

Courtesy of "Yachting"

THE START OF RACE BETWEEN "DEFENDER" AND "VALKYRIE III"

It was forty-eight years later that the *America,* carrying an identical rig, raced from New London to a finishing buoy in Gardiner's Bay, across the Long Island Sound, with the big fleet of schooners and sloops on the first day of the New York Yacht Club's annual cruise. She finished well up in the van, defeating many a well-known racing craft.

The America's Cup was presented to the New York Yacht Club by Commodore Stevens, head of the syndicate in 1857, as a perpetual challenge trophy. Little did any one dream then that millions would be spent by British yachtsmen to bring it back to its old home, or that American yachtsmen would spend an equal amount to keep on our shores the symbol of the world's yachting supremacy. To measure the cost of a modern cup defender is to pass the quarter-million

mark. To gauge its defense from a sentimental viewpoint is to recall the races of more than half a century and the hand-in-hand growth of yachting in this country.

It was nineteen years from the winning of the America's Cup before a British challenger crossed the Atlantic. In that time interest in yachting grew, and the most notable event was a transatlantic race held late in December of 1856 for a purse of $60,000. There were three contestants, all schooners, the *Vesta, Fleetwing,* and *Henrietta.* Starting from Sandy Hook in blustery weather, the race ended at the Needles and the *Henrietta* won. Captain Samuel Samuels, former skipper of the clipper ship *Dreadnaught,* was the *Henrietta's* captain.

Courtesy of "Yachting"

THOMAS W. LAWSON BUILT THE "INDEPENDENCE" FOR THE CUP'S DEFENSE

The *Cambria* was the first British challenger. She was deep and of narrow beam, while the Yankee yachts, fourteen in all, were, like the *America,* broad of beam and drawing less water. Nine of the defenders raced over the finish-line ahead of the *Cambria* on August 8, 1870, with *Magic* as the winner.

Then followed the real races, in each of which a British challenger met an American defender, each especially built for the event, and chosen as the speediest yacht that flew British or American colors. The *Columbia,* next to defend our honors, against the *Livonia,* was the first striking model, for she carried a center-board, or movable keel, which was lowered when beating to windward and drawn up when sailing before the wind. The "skimming dish," as our British

Courtesy of "Yachting"

THE "DEFENDER" PASSING UNDER BROOKLYN BRIDGE

Courtesy of "Yachting"

"COLUMBIA" AND "SHAMROCK" IN THE LAST RACE OF 1899

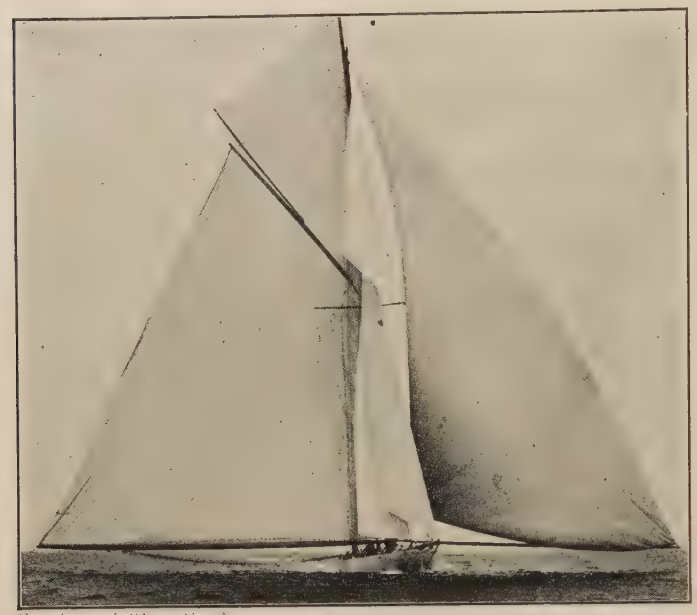
cousins called the *Columbia,* easily won over the deep-keeled *Livonia* in the series of 1871. Two out of three she took; and the *Sappho,* another "skimming dish," proved victor also by winning twice from the *Livonia.* The *Madeleine,* in 1876, and the *Mischief,* in 1881, kept the Cup over here; and then came the series between the *Puritan* and the *Genesta* in 1885. It stood out above the previous matches, for then really began the science in designing a racing yacht's hull. In one race the *Puritan* fouled the *Genesta* and, under the rules, lost; but Sir Richard Sutton refused to accept such a hollow victory. In the last race the *Genesta* was well in the lead near the end of the forty-mile race in deep water. The two yachts finished in a gale, and the Yankee defender forged ahead and held the Cup by the narrow margin of 1 minute and 38 seconds.

Courtesy of "Yachting"

"SHAMROCK II," SIR THOMAS LIPTON'S SECOND CHALLENGER

The *Mayflower* defeated the *Galatea* in the following year; and the *Volunteer* the *Thistle* in the succeeding one. Then came a break in the races, until six years later, when the *Vigilant* won from the *Valkyrie II;* and the *Defender* showed the way next to the *Valkyrie III.*

The trial races between the big sloops for the honor of defending the Cup excited interest second only to the Cup Races. In 1899 it was nip and tuck between the old *Defender* and the new *Columbia* before the latter was chosen to meet the famous *Shamrock I,* Sir Thomas Lipton's first challenger.

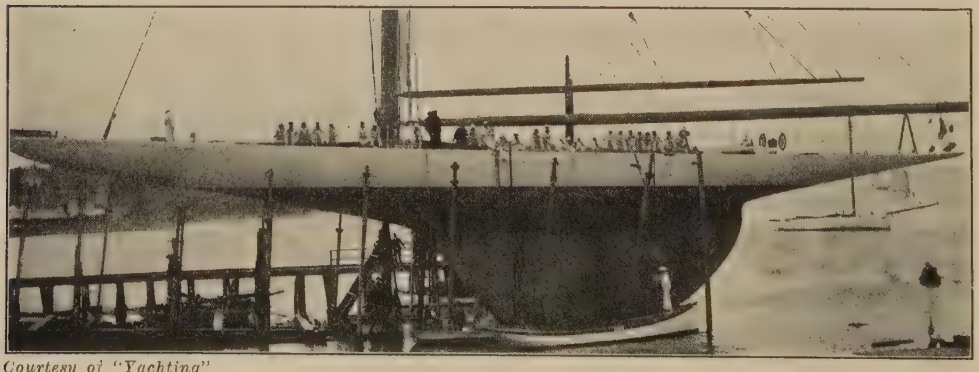


Courtesy of "Yachting"

THE CUP DEFENDER "RELIANCE" RUNS HOME WITH SPINNAKER SET

For six races, between 1899 and 1901, the *Columbia* showed her heels to *Shamrock I* and *Shamrock II*. The *Reliance* won her three races in 1903. In 1920 the *Resolute* met *Shamrock IV* in a series of five contests, winning three, and losing one as the result of an accident.

In all these Cup Race series, covering more than two decades, the models of the defenders and challengers were much alike. Their hulls were twice as deep and four times as long as wide. Big fin keels that extended twenty feet below water held them up in the stiffest blows when beating to windward; for all races are now held in deep water, where a fixed keel is superior in every way to center boards. The British usually excelled in the wonder-

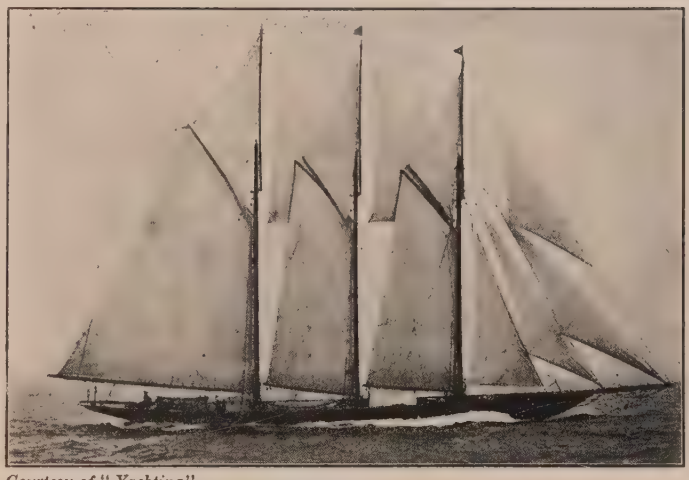


Courtesy of "Yachting"

THE CUP DEFENDER "RELIANCE" IN DRY DOCK

ful fit and spread of their sails, but the Yankee ninety-footers had the advantage in both hull and crews.

Deer Island, off the coast of Maine, and Long Island were the recruiting-grounds for the Cup racers. Under the rules the sloops were limited to ninety feet on the waterline, but overall they ran up to one hundred and thirty-odd. By the conditions governing the races, the challengers were entitled to choose the rig of the contesting yacht, and the British in recent years uniformly favored the sloop. In the last of the single-stickers the spread of canvas towered up to a height of 175 feet above the waterline, and with club topsail, headsails, mainsails, and spinnaker they carried an enormous stretch of sail.



Courtesy of "Yachting"

THE SCHOONER "ATLANTIC," WINNER OF THE OCEAN RACE

Should Great Britain eventually succeed in lifting the Cup, it is probable that we would challenge with a schooner. Most notable of the performances made by recent schooners flying the American colors was that of the *Atlantic,* winner of the ocean race for the trophy offered by the Kaiser in 1905. The schooner-rigged yacht is in its element in ocean races, which range all the way from the crossing of the Atlantic to deep-water runs along the coast.

A famous ocean race was that of the schooners *Katoura* and *Elena,* in 1916, for the Brenton Reef Challenge Cup. Ever since that trophy was put up in 1872 there has not been a harder fought race nor one sailed in faster time. Starting from the Ambrose Channel Lightship, off Sandy Hook, the two fast schooners raced in a fresh breeze, with every bit of sail drawing, for the Brenton Reef Lightship, just off the entrance to Newport Harbor. The *Katoura* rounded the halfway mark a half hour ahead of the *Elena* and finished one hour and a scant half ahead. She had logged the 264 miles in a little over 22 hours, beating her previous record of 1915 by five and a half

hours, when she had defeated the redoubtable *Atlantic*. In the freshest wind she made sixteen knots an hour. The Cape May Race, which is from the Ambrose Channel Lightship to Cape May, is second only to the Brenton Reef Race. The *Dreadnaught* was its first winner, in 1872.

Courtesy of "Yachting"

A DEAD BEAT TO WINDWARD

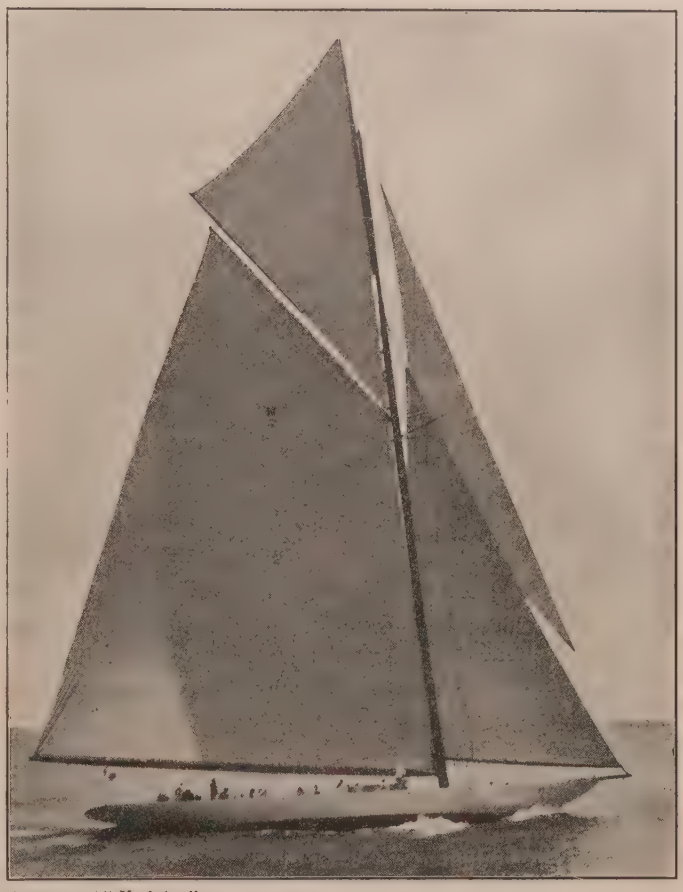
A feature of the yachting season is the cruise which every yacht club, on either coast, the Great Lakes or other inland waters, holds annually. On the summer cruise of the New York Yacht Club, for instance, it is not uncommon to count 300 yachts, sail and steam, flying the blue and red burgee with its white star. The cruising squadron is a beautiful marine picture. From port to port on its itinerary races are held, and while the bulk of the fleet anchors at Newport for Regatta Week, the cracks fight it out over the course outside for valuable trophies. The harbor, at the height of the regatta, is jammed with almost double the strength of the cruising squadron, and the launches can barely thread their way among the cruising and racing yachts, both steam and sail.

Whoever has seen the blue ribbon sloops in a brush for the America's Cup cannot forget the splendor of this deepsea classic. Yachts of every class, crowded excursion steamers, tugs and all manner of craft people the waters about the red Sandy Hook Lightship. Coast Guard cutters and slate-gray destroyers dart here and there, patroling the course and driving interlopers away.

As the preparatory gun barks from the flagship the two sloops

jockey for the windward berth. Their course is signaled to them, and as the smoke of the starting-gun drifts away they race for the line.

The wind is strong but they eat into it with the stiffness of a liner, with their deep keels holding them to it and a smother of spray dancing at their bows. Their white-clad crews mass to windward, flat on the decks that are broken only by neatly coiled halliards, foot rails and hatchways. Flying along with masts aslant and lee rails under, the wet bronze of their underbodies glistens in the sun. Their white sails are taut as whipcords, and from the watching fleet comes a roar of whistles, sirens, and cheers in tribute to their beauty.



Courtesy of "Yachting"

THE "RESOLUTE," CHAMPION OF 1920

The first race is fifteen miles to windward and return, and the second over an equilateral triangular course of thirty miles. If a third is necessary it is fifteen to windward and return.

Often they stand on different tacks, separated by miles, and not until they cross bows or round an outer mark is it possible to know which leads in a close race. Every advantage of wind and current is fought for by their shrewd skippers. The making of sail at a critical moment, or the neat turning of an outer mark, may prove the deciding factor of the race.

In the last of the series in 1899, between the *Shamrock* and the *Columbia,* the British sloop, sending up her biggest club topsail in a heavy blow, and risking the loss of her mast, almost overtook the

Courtesy of "Yachting"

THE "RESOLUTE," "VANITIE" AND "DEFIANCE" WERE THE CUP CANDIDATES IN 1914

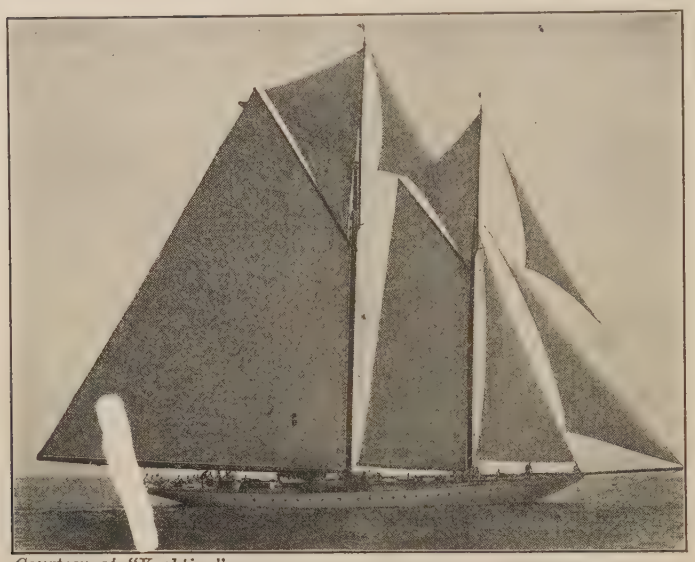
flying Yankee in the last yards of the fifteen mile run home. Only the margin of 41 seconds defeated her plucky maneuver.

The steam yachts that sail under the American yachting ensign are second to none in their cruising or racing qualities, or in the luxury of their appointments. Many of them are auxiliary rigged,

THE PRESIDENT'S YACHT, U. S. S. "MAYFLOWER"

Photo by Stebbins

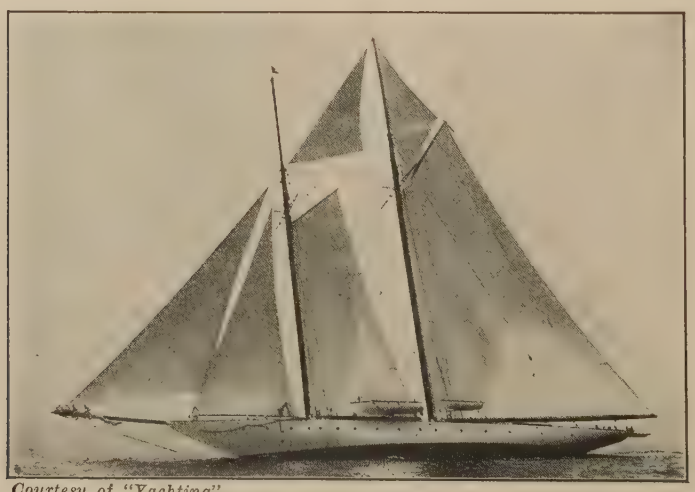
AN AUXILIARY SHIP-RIGGED YACHT



Courtesy of "Yachting"

THE CRACK SCHOONER YACHT "ELENA"

using sail or steam. Some have passed through the Panama Canal or the Suez to the Far East, and others have steamed up the mighty Amazon. A few have shown their burgees in every corner of the world. Others are content to confine their cruises to the limits of a fresh-water lake or river. The yacht *Arrow* not only is the fastest American steam yacht, but no foreign one can hold her own with this modern high-speed turbine yacht. The *Arrow* is 132 feet long, owned by Charles R. Flint, and with her speed of 45.6 knots could give the speediest destroyer a royal race for honors.



Courtesy of "Yachting"

RUNNING CLOSE-HAULED

AN UP-TO-DATE FREIGHTER

XII

THE FREIGHT CARRIERS OF THE AMERICAN MARINE

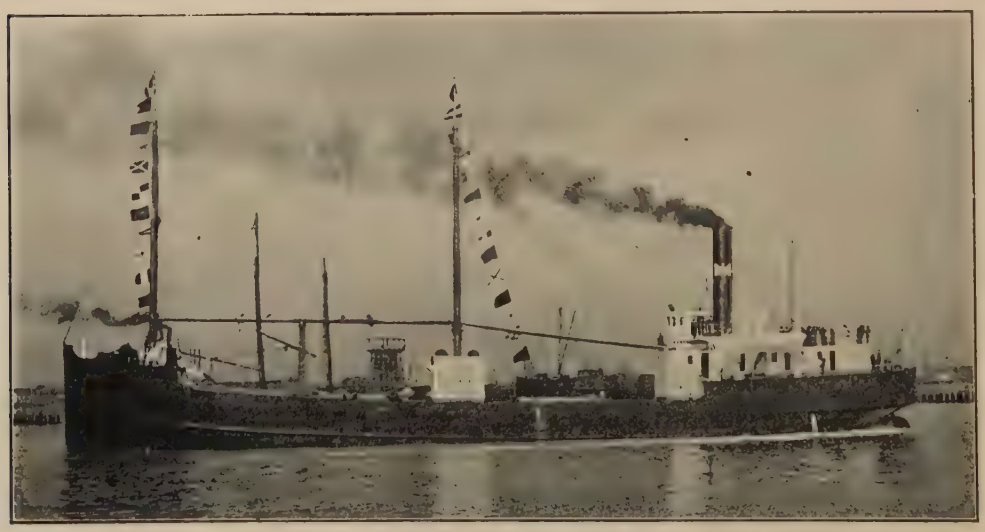
ALTHOUGH the United States was the pioneer in steam navigation, with Robert Fulton's epoch-making *Clermont* in 1807, her steam fleet has lagged for more than a century behind those of other nations. Our sailing packets and clipper ships led the world before the Civil War, but we were content to confine most of our steam navigation to inland steamers that plied the rivers and the Great Lakes with their paddle-wheels, while our ocean rivals far outstripped us on the blue water. And yet the first steamer to cross the Atlantic was the *Savannah*, an American vessel, eleven years after the *Clermont* steamed up the Hudson.

Great Britain lost her scepter as Mistress of the Seas to us but once, back in the '50's. Then she forged ahead again, gained command of the seas, and has held it ever since. But even as the wars we fought with other maritime powers, and later the Civil War, denuded the American merchant marine, the great European War helped build it up, until once more we loom up as a sea-going power commanding the respect of our foreign rivals.

Great Britain, Germany, France, Norway, and Japan were carrying the cargoes of the world when that conflict began. Subsidies and subventions by their governments had been a factor in the up-

THE FIRST MOTOR-DRIVEN TANKER

A MODERN WEST COAST TANKER



A MODERN LUMBER SCHOONER

A GREAT LAKES BULK FREIGHTER

building of their great merchant fleets. Cheaper coal and steel, the lower cost of supplies, and lower wages to their crews gave them a great advantage over the United States. Great Britain, however, built up her trade overseas with little resort to the subsidies that were the foundation of Japan's merchant marine, or the subventions that made Germany a leading maritime nation. Her cheap building, her many shipyards, and the worldwide trade of her far-flung Empire made her merchant marine the model for all other nations.

One great artificial aid to the increase of a merchant marine is the subsidy, which is the direct aid of shipping by a government without any requirement of special service in return. The other is the subvention, the indirect aid extended to its own shipping by a government in the form of lower canal or railway rates, of exemption from port dues, or in other favors that foreign ships plying in that government's waters do not enjoy. In return for this, the government requires that lines so favored must carry mail, or build its ships so that in case of war they easily can be converted into auxiliaries or transports.

A GREAT LAKES ORE AND FREIGHTER

The growth of our merchant marine was hampered for decades by the lack of either subsidies or subventions, and still more by the handicap of higher wages, more cost in building, and the greater expense of fitting out and supplying a Yankee merchantman. But the war changed all this in a trice. The countries at war lost millions of tonnage by capture, destruction by submarines, raiders, and mines. Still more millions were barred from overseas trade by liners and merchantmen being interned in the neutral ports in which they were at anchor when war was declared. Another heavy toll was taken when warring governments commandeered their trading ships for service as auxiliaries to the fleets and transports to the armies. The world was hungry for ships to carry its freights and foodstuffs. The United States found itself supplying steel and coal to other nations. The great gap between the cost of supplies of ship-building materials and even of wages narrowed in our favor. The demand for ships led to high freight charges. Old shipyards were opened up, new ones enlarged, and old sailing vessels and iron hulks were hurried back into commission. The operating of ships and their building and repair became a booming industry that Americans had despaired of ever seeing. All these factors that could be traced directly to the war aided in the feverish drive that put the American ship-building industry back on its feet.

THE CAR FERRY "ANN ARBOR NO. 6," FERRYING 30 FREIGHT CARS THROUGH HEAVY ICE ON LAKE MICHIGAN

It became a common occurrence for a ship to pay for itself on its first round-trip. Romance came back with the tales of the salvage of stranded hulks which had been left to rot in out-of-the-way corners of the world. American shipbuilders made them fit for the high seas once more and the despised wrecks made fortunes for the men who had the courage and foresight to rehabilitate them. It was not long

before the overhauling of old methods, the improvement of plants, and the ingenuity of Americans made it possible to build a ship as cheaply as the British yards on the Clyde and Irish Sea could.

With the boom came new types of ships for coastwise and overseas trade. The great demand for oil alone led to the building of the first motor-driven tanker and of the first motor-driven schooner designed for the oil-carrying trade. The *Brammel Point* was the first tanker. Built by the Baltimore Dry Dock and Shipbuilding Company, she carries her oil in twelve tanks. They are filled and emptied by

THIS TYPICAL LAKE FREIGHTER CARRIES ORE, COAL AND GRAIN

steam cargo pumps, and her windlass and cargo winches are worked by steam.

Starlite and *Twilite* were the names given the first motor schooners, which now have swelled into a fleet of both steel and wooden schooners of this design. Designed by Cox and Stevens, of New York, they were built by the Toledo Shipbuilding Company for the Standard Oil fleet. Their four masts are without topmasts, and sailormen on the Pacific Coast long ago dubbed such schooners as bald-headed schooners. From their berth on the Great Lakes these motor-driven craft were delivered in salt water. Since that delivery the same naval architects have planned many in both steel and wood for both coasts. They marked a great advance in the cheaper transportation of cargo, and with their fore-and-aft sails alone are capable of good speed. The

machinery, as in many other modern cargo carriers, is aft, and they have a single deck for the cargo of oil, which is carried mainly in three center-line hatches, each equipped with its winch and cargo boom.

At the end of the war the tonnage of the American marine had increased practically six times. In steel and iron seagoing steam and motor tonnage we ranked fourth but ten years later we held second place. However, through overbuilding and adverse trade conditions we had laid up 4,265,000 inactive tons, for the gigantic shipbuilding carried on after the war was not justified. Congress then appropriated $25,000,000 to refit 375 of the idle shipping fleet over a period of years. The coasting trade, however, showed a constant gain through the diversion of ships from the lagging foreign trade to coastwise operation.

To-day American freight carriers operating in the Caribbean regions range up to an individual tonnage of 4,500, with a speed of 11 knots. From the Pacific ports they operate to Alaska, the Far East, Mexican, Central American and South American ports, the South Seas, Australia and New Zealand, Hawaii and one line, the Robert Dollar, has an around the world service. The largest Pacific freighters are 9,500 tons, with a speed of 13 knots, while combined passenger and freight ships range up to 14,000 tons and 23 knots. On the Great Lakes there has been a steady increase in oil-tankers, self-unloading ore-carriers, bulk freighters and grain carriers. Possibly the most characteristic Pacific Coast type, in comparison to those peculiar to the Great Lakes, is the schooners that carry the bulk of the Pacific lumber trade. They must carry heavy deck-loads, enter shoal harbors, and make headway against the wind when running light. Built of steel, with two-masted schooner rig, devoid of a bowsprit, they use oil for fuel. The tanker of the Pacific Coast is another interesting type. On a modern one we find a four-foot cofferdam separating the fuel oil from the main oil tanks. Between decks she is fitted with summer tanks to fit her for the demands of the oil-carrying trade. The big cargo of oil is handled with extra heavy duty pumps.

Contrary to general belief the Great Lakes has a tonnage that eclipses that which clears and arrives in any of the great seaports of the world. For that reason a separate study is well worth while.

A TRIM WEST COAST FREIGHTER

A MODERN EAST COAST TANKER

AROUND-THE-WORLD COMBINATION PASSENGER AND FREIGHTER

The history of shipping on the Great Lakes, from the canoes of the Indian and French traders until the mammoth orecarriers of to-day, is full of romantic interest. Like the ocean, it had its first sailing vessel and its first steamer, and the Battle of Lake Erie has gone down into history among the memorable naval engagements. One of the most interesting bits of the story of these great fresh-water oceans lies in the impetus that was given to its early shipping by the French voyageur La Salle. He built the first trading ship in 1679, near Buffalo. When the Government engineers began the construction of the locks at Sault Ste. Marie, where Lakes Superior and Huron mingle their waters, they found an old canal, with its single lock, that La Salle had built 200 years before to carry bateaux and canoes around the falls of the Ste. Marie. Now the tonnage that passes through the Soo in a year is four times that which the Suez Canal can boast. For each vessel that takes the short cut between the Mediterranean and the Red Sea five use the Soo. Detroit, however, half-way between Lakes Huron and

A TYPICAL YANKEE FREIGHTER

Courtesy of the "Scientific American," Copyright by Munn & Co., Inc.

A SUBMARINE COMMANDER HAILING A MERCHANTMAN

Erie, is the greatest highway for ships in all the world. When Antwerp led the seaports just before the World War with nearly 30,000,000 of net freight tonnage in a year, Detroit more than doubled her record. In ship-building, too, Detroit leads all the lakes in the output of her shipyards.

The lake shipyards not only turn out the fleets for the lakes but steamers and barges for the Atlantic trade that find their way into every sea. At one time great fleets of three-masted schooners carried the grain of the Great Lakes, but now immense steel bulk freighters have driven them to the wall. Few wooden ships are built there; little but steel and iron. The first modern steamers were the coarse freight wooden steamers of the '70's, followed in the next decade by the steam barge and its double tow. Iron steamers for the ore trade came next and then the steel freighter.

THE BULL TRAMP STEAMER "CORNELIA" AND HER CARGO BOOMS

The orecarriers are the largest fresh-water vessels in the world, and few ships that sail the high seas are larger. Modern ore-handling machinery operates in their roomy holds down through hatches, lifting out the ore in clam-shell buckets; and the holds are clean of stanchions and stringers, so that, in reality, they are immense steel barges. Each carries what the whole fleet of sailing vessels once held.

The lake freighters are divided into two great classes: the bulk freighters for ore, coal and grain, and the package freighters in which miscellaneous cargo is stowed. The *Marquette & Bessemer No. 1* is a good type of the bulk freighter. Coal cars run on its deck and are

emptied into the yawning hold. The *Harvester* is typical of the largest orecarriers with its tremendous cargo capacity, its stack and machinery well aft, and its huge bow.

Much of the oil carried on the Great Lakes was at one time transported in the whalebacks, most curious of all lake vessels. They were cigar-shaped, with decks rounded like a whale's back, and but a few feet above water. Since 1900 no whalebacks have been built. The modern oilcarrier in these waters is a trim steamer, remarkable for the flying bridge that runs fore and aft almost for its entire length, and with squat expansion tanks jutting up above deck. Baldheaded schooner barges carry their share of the oil also, being towed by steamers, and most of them find their way to the ocean oil fleet.

Truly typical of the lake traffic are the side-wheel and stern-wheel paddle steamers for both passenger and freight traffic. Most of the latter are of shallow draft, built on the lakes, knocked down and shipped by rail to interior lakes, there to be assembled and relaunched. First of all steamers to ply the Great Lakes was the side-wheeler *Walk-in-the-Water,* built one hundred years ago. Nowhere else has the side-wheeler been developed as on the lakes, even the Mississippi River steamers being pygmies in comparison.

The Great Lakes are the scene of terrific gales, and its craft are sturdily built, for they must not only buffet wind and sea but fight ice in the winter. They are American ships in every sense of the word despite the fact that many of them never venture on salt water, and the history of shipping there is a bright page in the annals of our merchant marine.

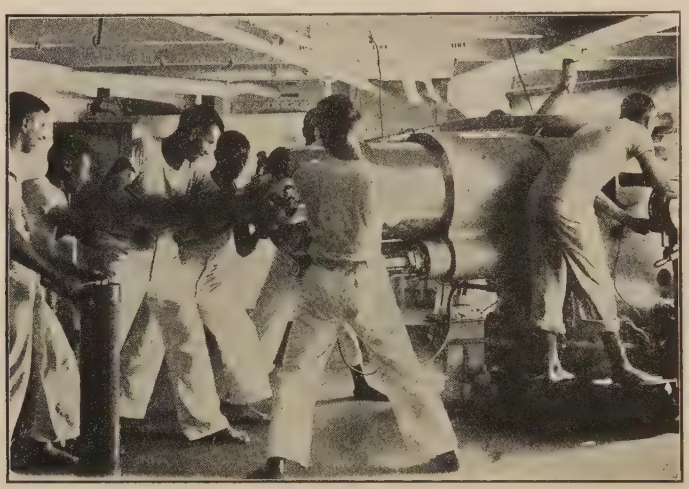
There are no more interesting craft on the face of the waters than the tramp steamer. Dingy and unkempt as a rule, they are giving way to smarter ships, and despite their humble appearance there is no ship to which the romance of the sea has clung so tenaciously. A tramp will run anywhere, combing the coast and the transatlantic routes for work, scorning risks that would appal the average skipper. Be it potatoes or dynamite, molasses or railroad rails, it is all in the day's work for the tramp steamer. If she carries grain and a leak develops, the swelling of her cargo will burst out her plates. She runs the risk of fire with her load of dynamite or cotton. Railroad iron rails and lumber are prone to shift and pound out her sides. But the tramp takes them all. She is the vagabond of the sea, picking up her cargo where she may, indifferent to where it takes her. And the tramp made its harvest when the demand for ship bottoms grew. She

Photo by Stebbins

THE MARKS OF A WINTRY PASSAGE

carries her engines sometimes aft and sometimes amidships. Staunchly built as she is, many a tramp is lost at sea through hazards that other cargo carriers do not face.

The story of the first American tramp steamer is well worth knowing, for the *Winifred* led to a fleet of fine tramps which were the first to dispute the monopoly enjoyed for years by foreign tramp steamers. When the shipping firm of A. H. Bull & Company of New York built the *Winifred* at Bath, Maine, in 1898, it was a risky venture. She ended as a tanker on the Great Lakes, for she was too expensive to operate as a tramp. Then the same company built the *Jean* at Newport News and proved to a skeptical shipping fraternity that it was possible to build a successful tramp in this country. Her engines, shafts, cylinders, and other parts were built to standard type in different parts of the United States and then assembled at the shipyard. Now it is no longer necessary to follow out this troublesome method, for the tramps that followed led shipbuilders to provide for all parts at their own yards. This company now operates a fine fleet of fifteen tramps—glorified tramps when compared to the foreign type. Four make regular runs between Porto Rico and other ports while the rest range from Rio to Mobile, Buenos Aires to New England, or from the West Indies to Norfolk, wherever their owners find freight waiting for them. Two were sunk by mines in the North Sea while under charter to this company.



THE TYPE OF GUN THAT MERCHANTMEN CARRY IN WAR TIME

There are still other types of cargo boats which are built for one trade like the ore boat of the Great Lakes, the bald-headed lumber schooner of the Pacific Coast, and the motor-driven tanker. There are tankers that carry molasses from the cane-fields of Cuba and Porto Rico to all ports of the world, and there is a handsome fleet

that carries forty million bunches of bananas from Central American ports to the United States yearly.

Due, as has already been pointed out, to overbuilding and adverse foreign trade conditions, the great drive for supremacy on the seas in our freighter fleet, was abruptly halted. Although during the World War American freight carriers to the number of 204 with a total gross tonnage of 590,000 were either sunk or condemned, we had, at the time of the Armistice, swelled this fleet to 2,166 ships with 8,688,337 tons. Six years later showed even a greater increase, and then the drive halted. Ships were laid up, either temporarily or permanently, and many scrapped. To-day there is little prospect that shipbuilding will be revived to any great extent. To-day, however, for other nations suffered from the same general conditions, the United States stands second only to Great Britain in the number and tonnage of its freight carriers.

Photo by Stebbins

THE OLD SCHOOLSHIP "ST. MARY'S"

XIII

OUR NAUTICAL TRAINING SHIPS

THE past few years have seen a remarkable advance in American shipping. Its growth and prosperity have recalled the halcyon days of the middle of the past century. The increase in our foreign tonnage, the activities in our shipyards and the development of a great coast-to-coast trade through the Panama Canal, all have quickened public interest in matters of the sea. As this interest has expanded and shown the vital needs of the merchant marine, so the public has been attracted more than ever to the part that our nautical state schools play in upbuilding the supremacy of the American flag on the high seas.

The first step taken to provide nautical schools, so that in time the American merchant marine could be manned and commanded by trained Americans, was taken by Congress in 1874. On June 20th of

Photo by Stanley W. Todd

EXERCISING UNDER OARS

that year, when our shipping was at low ebb, Congress voted power to the Secretary of the Navy to promote nautical education by furnishing states on the seaboard with ships and equipment to instruct the youth in their borders in navigation, steamship marine engineering,

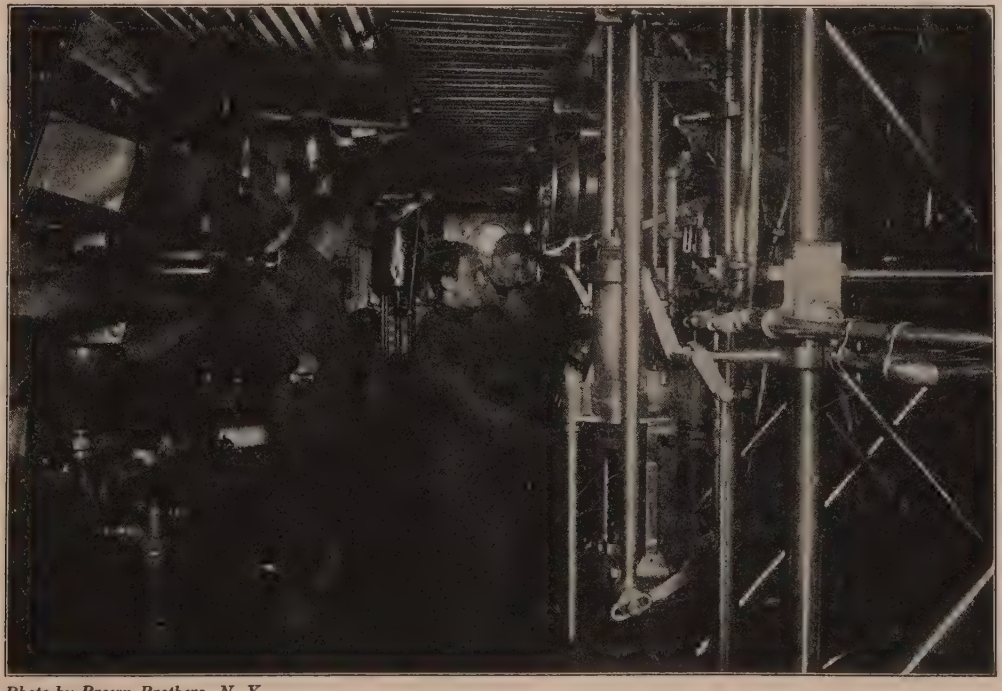


Photo by Brown Brothers, N. Y.

ENGINE ROOM OF A TRAINING SHIP

and electricity. Until then the only avenue to a sea-faring life was through the forecastle, with its meager pay, poor fare, hard knocks, and privations. In that same year the city of New York established its nautical school with the old *St. Mary's,* a noted man-o'-war in her time.

Massachusetts followed in 1891, wisely placing its school under the control of the state, and receiving from the Navy the bark-rigged steamer *Enterprise.* It was in 1913 that the New York Nautical School passed into the state's control and became firmly established with a liberal appropriation to carry out its aims.

Three States have availed themselves of the use of gunboats loaned by the United States Navy for nautical training schools. The *Annapolis* is assigned to Pennsylvania, with her headquarters at Philadelphia. Massachusetts has the *Nantucket,* which supplanted the old bargentine steamer *Ranger,* one of the first iron ships of the Navy. The *Newport* is at New York.

Their graduates are not only in demand in our Merchant Marine, with their career assured, but the Navy sees in them splendid officers for the auxiliary fleet that a war would demand.

The other states have lagged behind, but the cruise of the *Newport* to the Pacific Coast in 1915, when she was held up on that coast for three months by slides blocking the Panama Canal, stirred the Pacific states to serious agitation for nautical schoolships along the same line.

To enter either of the three schools a boy must be a resident of the state, between 16 and 20 years of age, and pass a mental examination such as is required to enter the high schools of that state. He must also be of rugged physique and undaunted by the work and hardships of the sea-faring life that it is his ambition to lead. There is a deposit of $85 to cover the cost of blue and white uniforms and the technical textbooks required at entrance; but once he has put on the uniform of the State's nautical training ship the state pays all his expenses and gives him a training that will fit him for an officer's duties on the deck or in the engine-room of a modern steamship.

A well-rounded officer, whether he is a deck or engineer officer, must have training in both branches of the sea. He will not make a good engineer unless he has first acquired the "sea habit" by preliminary training as a seaman. And to make a first-class deck officer and be fit to command his own ship, he must know much of its machinery. He must learn enough of machinery to weigh anchor and

A SCHOOLSHIP UNDER FULL CANVAS

Photo by Stebbins

FURLING SAIL ON A SCHOOLSHIP

to hoist in and out cargo and boats, and know something in addition of the main as well as the auxiliary engines of his ship.

The course at the nautical schools is founded on that sound idea. In their first year as nautical cadets the duties of a seaman are taught to all. In the second year they are divided into seamen cadets and engineering cadets and specialize that last year in the duties assigned.

The year in the nautical schools begins with the winter term, running from November to April. The ships are moored alongside roomy docks, with recitation halls and sails and rigging lofts for the winter's theoretical work, while the cadets live aboard ship. The day begins with reveille at 6:30 o'clock and until inspection at 9 o'clock the apprentices to the sea are busy lashing

Photo by Brown Brothers, N. Y.

SHOOTING THE SUN ON THE "NEWPORT"

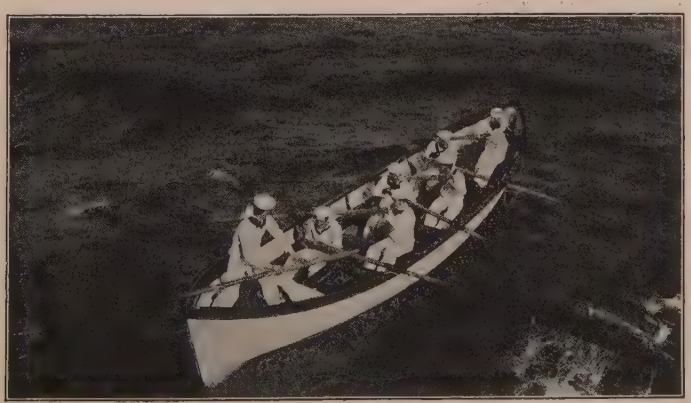


Photo by Stanley W. Todd

LIFE BOAT DRILL

Photo by Stanley W. Todd

INSTRUCTION IN DEEP SEA SOUNDING

and stowing hammocks, washing down, preparing their quarters for inspection, and at breakfast. After the inspection at 9 o'clock—for naval discipline is the model of the nautical ships—runs a day of study and recreation, with recreation periods, until hammocks are piped down at 9 o'clock and the young sailors turn in for the night.

With the last of April comes the most welcome day of the year, when the three schoolships cast off from the docks to which they have been moored all winter long, and turn their bows to the south for the summer cruise. It lasts from four to five months, and underway and in port it is devoted to practical work. Even before the World War the schoolships had cruised in European Waters, and still do so. Another fascinating cruise finds them passing through the Panama Canal for stops along the Pacific Coast and as far west as the picturesque Hawaiian Islands. While at Panama the cadets study the construction and operation of

LEARNING THE USE OF THE SEXTANT

Photo by Brown Brothers, N. Y.

CADETS IN THE SAIL LOFT

Photo by Brown Brothers, N. Y.

KNOTS AND SPLICES IN THE RIGGING LOFT

Photo by Stebbins

OUTWARD BOUND ON A CRUISE

SETTING THE SPANKER

the gigantic locks. Other cruises find the schoolships off the New England coast, with frequent stops at various ports for liberty, and at well-known training grounds for serious work both ashore and in the small boats.

The work at sea is very interesting and covers a great deal of practical ground. The cadets of the third and fourth classes learn the ship and its gear, work aloft in the handling of sail, and are taught the use of the sounding machine, coasting lead, and ship's log. They take their watch as lookouts, their tricks at the wheel, and learn signaling with the semaphore. In port the handling of small boats under oars and sail, and swimming are on the daily routine. In secluded training grounds they go ashore for rifle practice; and besides all this they apply themselves to the more prosaic tasks of painting the ship and caring for her hull and rigging in other ways.

Photo by Brown Brothers, N. Y.

THE NEWPORT CADETS AT MESS

The first and second classes are trained as deck and petty officers. They stand regular watches and carry out the exacting routine of a quartermaster and a boatswain's mate at sea and in port. They steer by compass, by the wind, and study the art of piloting. They also become proficient in sending and receiving radio messages. The *Ranger's* cadets made the Pollock Rip Lightship on the 1915 cruise in a fog by the use of the submarine signaling apparatus.

The cadets of the engineer division carry out their duties below in the same thorough manner. When the ships put back to their home ports the sea-bronzed cadets have learned much in a way that no other method could rival. On the cruise of the *Newport* in 1915 to the Azores, when her engines were disabled, they made the long run home under sail. At Bermuda a big freighter was short its second

officer and that vacancy was filled from the crew of the nautical schoolship.

After graduation there are many openings waiting for the nautical school graduates. Some are now commissioned officers of the Navy, Marine Corps, or Coast Guard. Others are engaged as pilots or engineers in the Isthmian Canal Commission; and still others find berths in the Government's Steamboat Inspection Service. The great bulk of them enter the merchant marine as subordinate officers, and many are now walking the deck of a fine liner or freighter as her captain. In the Spanish-American War more than a hundred served their country as volunteer officers or petty officers of the Navy. To-day they could place twice their number of graduates in fine positions at sea if the two nautical schoolships had the facilities to turn out so many.

Both schools have seen a steady and constant improvement in courses and equipments, and those who have promoted this patriotic work have had always in view the increase of our sea strength. Their graduates rank as the best officers in our merchant marine and have pointed the way, through the increase of these splendid schools, to making the nation's sea power felt, not only in her merchant marine, but in her naval reserve in time of war.

ON THE RIFLE RANGE

XIV

THE MAKING OF A MAN-O'-WAR'S-MAN

WHEN the United States Navy changed from its wooden walls and muzzle-loading batteries to walls of steel and breech-loading guns, and steam supplanted sail, the old mossbacks shook their heads and coined the maxim: "Wooden ships and iron men; iron ships and wooden men." They had joined a line-of-battle ship without any training ashore and learned the craft of a sailor by hard knocks. For a sailor of the old days to pass through one of the modern naval training stations where Uncle Sam turns out his sea-fighters to-day would be as hard as taking a degree at a large university.

The modern sailor knows little of royals or topgallants'ls or laying aloft in a gale to pass a bunt lashing, but when he has finished his training as an apprentice seaman he is fit to take his place in a ship's company that makes its cruise on a man-of-war equipped with intricate machinery, with high-powered guns, and the latest in both steam and electrical devices. He must know something of seamanship, gunnery, electricity, mechanics, ordnance, and signaling. In one of these branches he must specialize through his four years' cruise; and he must be more or less familiar with good English, mathematics, geography, and the history of his country. The training station course has opened to him the royal road to promotion, either for an appointment to the Naval Academy as a midshipman or, if he

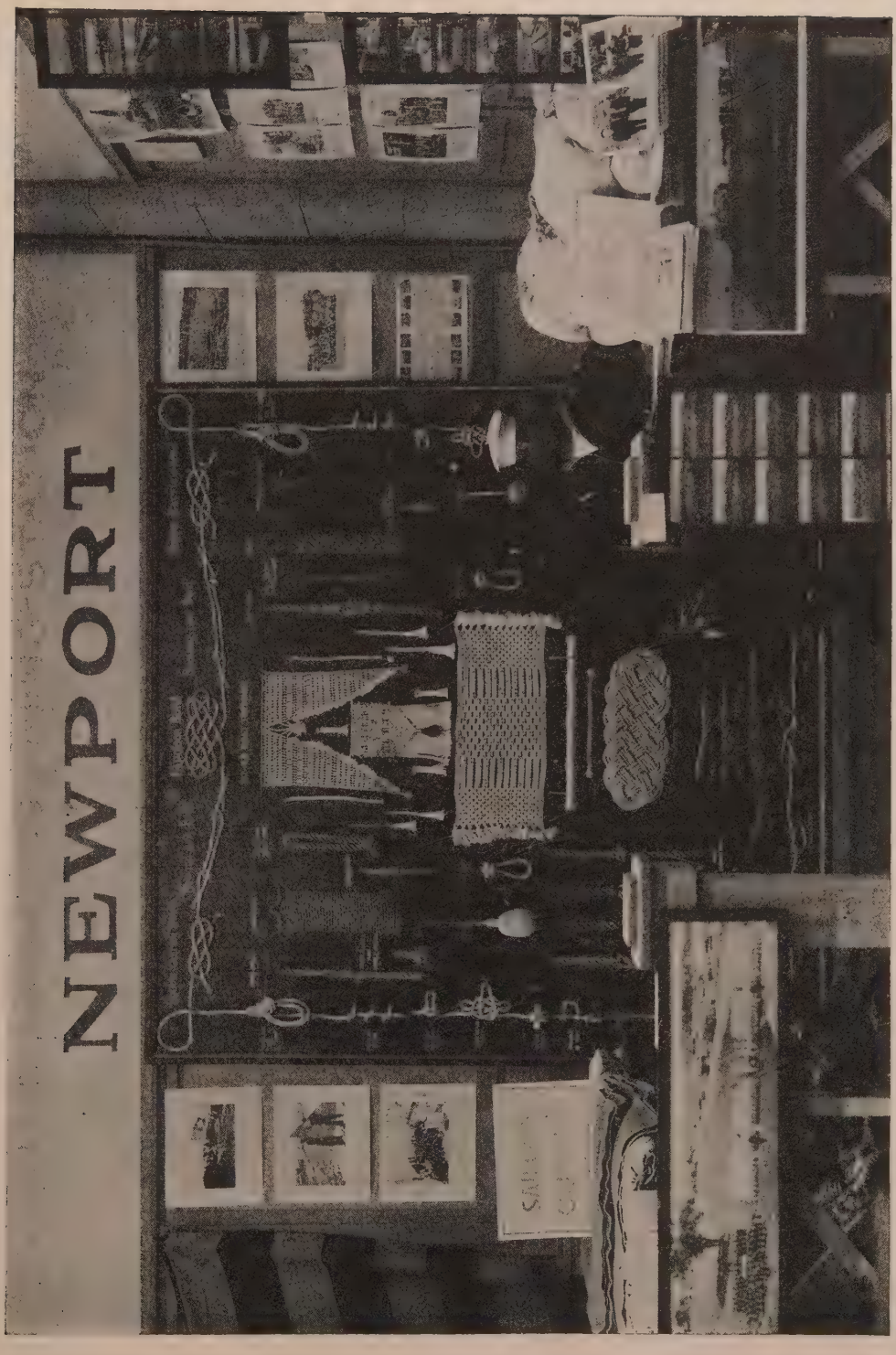
has passed the age limit for Annapolis, as a commissioned officer after he has reached the grade of warrant officer.

The oldest of all our training stations is that at Newport, Rhode Island, and it has proved such a success in giving the Fleet a trained body of apprentice seamen that training stations have since been opened at San Diego for the recruits enlisted on the Pacific Coast and west of the Mississippi, one on the Great Lakes near Chicago for the Middle West, and another at Norfolk, Virginia. All have been patterned after the Newport Training Station.

The average American knows Newport only as our most fashionable watering place, where society builds its costly villas, and where the great fleet of the New York Yacht Club rendezvouses each summer for its annual cruise and races. On Coaster's Harbor Island, where the oldest vessel of our Navy, the frigate *Constellation,* is moored, are a group of buildings and athletic fields that would be a credit to any American college. Its setting is picturesque, and the salt breezes that rule there all year round have much to do with building up the physiques of the recruits who are sent there, and in giving it the proper deep-sea atmosphere that follows them through their life in the Navy. Drill grounds that hold a brigade and target ranges equipped with every facility for rifle and pistol firing complete the spot where the foundation of the training of our American bluejacket is laid.

All recruits enlisted in the Navy between seventeen and twenty-five years of age, who have no skilled trade, such as machinists or electricians, are sent to one of the stations for training as apprentice seamen. On his arrival the budding sailorman is quartered in what is known as the recruit or detention barracks for his first three weeks' training. An outbreak of contagious diseases, such as mumps or measles, is by this plan kept from spreading through the station. He is mustered into a company of ninety recruits under a petty officer and taught first the spotless habits that follow him through his cruise. Cleanliness of body is begun with a daily shower-bath, and the $60 uniform which the Government issues him without charge, his bedding, bag, and hammock, and all his equipment must be cared for so that it passes a daily inspection. This inspection goes to the point where the recruit must satisfy his instructors each day that his underwear is immaculate and that his teeth have been brushed and his shoes shined.

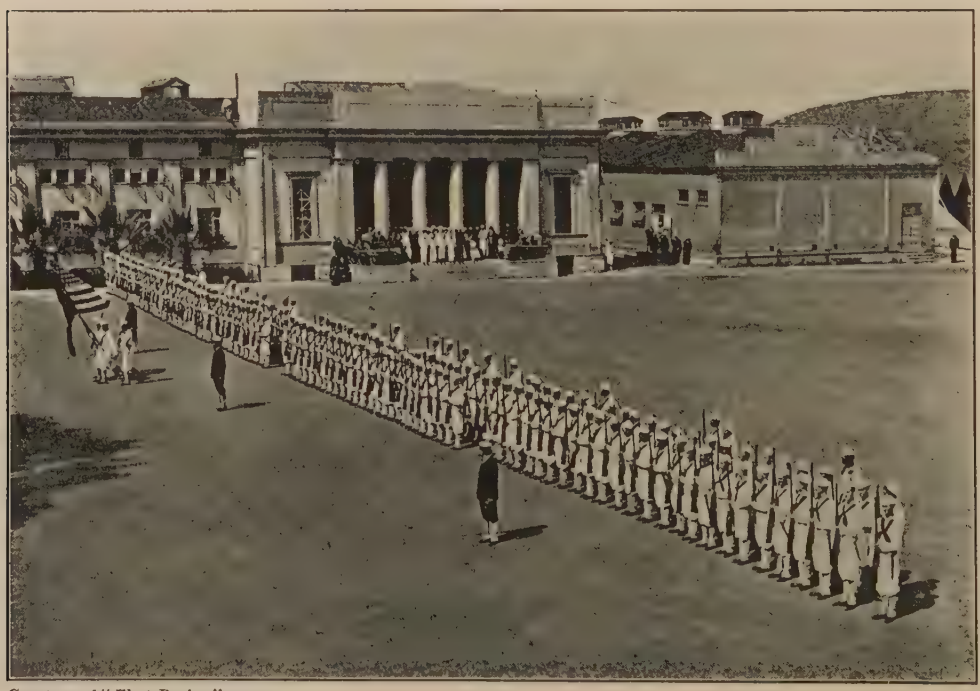
Soon after his arrival he is examined to see whether he shall be graded in the primary, intermediate, grammar, or high school grade



A KNOTTY PROBLEM

Courtesy of "Fleet Review"

RECEIVING THE COLORS AT SAN FRANCISCO STATION



Courtesy of "Fleet Review"

TROOPING THE COLORS

for daily instruction, and he is marched from one class to another and to all military formations and meals just as the midshipmen at Annapolis are. He begins his day with reveille at 5 o'clock in the morning, lashes and stows his hammock, and then takes his turn at the shower-baths. His breakfast is inspected by an officer and then, after a hearty meal, comes his personal inspection. Sick call is the next step in the day's routine, but with each week of regular, wholesome life this call of the bugle to "come get your quinine and pills" becomes more of a form than anything else. In the detention barracks he learns the Swedish physical drill, which works such wonders in building up and straightening out the average recruit, and swimming is taught and the rudiments of squad and company drill.

OFF FOR THE FLEET

It is a proud day for the recruit when he marches away from the detention barracks for the rest of his six months' course. On the indoor target range he is initiated into the use of the Navy rifle and revolver and made ready for the outdoor range, with its changing winds and shifting lights, to try his skill as a marksman.

He feels that he is well on his way to the goal of his ambition when his company is finally mustered in and marched down to the

SEA BAG INSPECTION

wharf where the frigate *Constellation,* veteran of the Navy, lies. He knows enough of his naval history to recall now the stirring sea fights in which the *Constellation* crushed the power of the *Corsairs,* which infested the Barbary coast early in the nineteenth century. He runs his eye with a sailor's appreciation over the tapering spars and beautiful lines, and crosses the gangplank with a determination to make short work of the mysteries of the seamanship that await him. Here he learns how to read a log line and to handle the head line that later he must heave while his ship is creeping through a heavy fog or in uncharted waters. He is taught how to box the compass and to steer, to bend a hawser and handle a heaving line, to sew canvas, and all the fascinations of knots and splices are here revealed to him.

With a small fleet of cutters and launches and whaleboats the recruit begins the training that fits him to handle them under sail and under oars, and strives to outdo the boats of other companies in making a clean landing at a dock, in tossing oars in salute to a passing officer, or boating them

Photo by Paul Thompson

LEARNING THE POINTS OF THE COMPASS

CUTTER DRILL UNDER OARS

smartly as the gunwale slides along the gangway of a ship at anchor. With gunwales under in a stiff breeze, or landing in the surf to carry out an attack on an entrenched enemy, and the rivalry of races with other cutter crews, he looks forward to those exercises more keenly than to any other incidents of his life at the training station.

Signals play a big part in the modern navy, and the training in this branch follows the recruit's work in battleship seamanship. Hardly has he tumbled out of his hammock, swung eight feet above the ground from hooks ten feet apart, before he casts a weather eye at the signal mast, which is visible from all the barracks. The first hoist displayed on it, in a colorful string of bunting, is the signal that tells every officer and man at the station what the uniform for the day is. Scattered about the big drill ground are squads armed with small signal flags, and back and forth flash messages and answers until the apprentice seaman can send and receive messages as quickly as hand and eye can work. At night he learns what the blinking white lights and rows of colored lights mean, and when he reports aboard his first ship the talk of the fleet by day and night is an open book to him.

NAVY HOSPITAL CORPS STRETCHER DRILL

The dashing artillery drill, with the three-inch naval guns which our ships send ashore in troubled Latin-

American ports, or for the protection of a consulate in the Far East, is the most popular of all the drills that come when the recruit takes up his gunnery and ordnance course. He is taught how to take apart and assemble his rifle and automatic pistol, and the guns of the secondary battery, which are a ship's defense against night torpedo attacks, are his to drill and learn. Then comes the instruction in the mysteries of shells and fuses and the smokeless powder used by the Navy, and gun sights and telescopes are explained to him by expert gunners.

When his mates have mastered the company and battalion drills they are marched out into the rolling countryside and are formed for an attack on an enemy position. Out go the scouts, then the thin firing line with its supports and reserves ready to feed it in time to give it the impetus for the stirring charge. Here and there certain men fall out, are given first aid for a simulated wound, or carried away by the stretcher men. The crack of blank ammunition grows into a roar, the supports rush up to fill the gaps and along the line goes the word, "Fix bayonets!" Hardly has the rattle of the long knife-like bayonets died out before the bugle sounds its thrilling summons, and with a lusty cheer the battalion sweeps over the ground in an impetuous charge.

One of the most picturesque of all the drills is the street riot drill, with its use of the hollow square, that moves along, ready at the word of command to burst into volley-firing on all four sides or to open and unmask the three-inch field pieces dragged within its walls.

The day ends with a dress parade or review, with its battalions stiff at attention; its long line of officers marching toward the brigade commander at the order, "Officers front and center. March!", the long line of rifles moving like one piece through the manual of arms; and then the rhythmical, stirring march past in review with each company striving as only young Americans can to outdo all rivals.

These and other ceremonies, with the colors flying and the band crashing out a lively march, live long in the memories of the apprentice seamen. Each morning, as the flag climbs slowly up the slim flagpole to the shrill of the bugles, and each night, when the brigade faces the lowering of the colors, and the band plays *The Star-Spangled Banner,* the apprentice seaman learns a new respect for his flag. His daily drills teach him instant obedience and, surrounded every day of his training with trained officers and graduates of the station, the traditions of the American Navy are instilled in him. Navy surgeons

RADIO INSTRUCTION AT THE NEWPORT STATION

THE BATTALION IN CAMP

DEFENDING BEACH FROM ENEMY RAID

teach him sanitation, first-aid help to the sick or wounded, and they take care of the health which the station breeds in him with its regular hours, its wholesome food, and its outdoor drills and sports. A Navy chaplain looks after his spiritual needs, and every day morning prayers are held as a part of his routine of development.

In the old days of the Navy salt was an unknown part of the ration aboard ship, just as distilled water and ice-plants and electric laundries were even undreamed of. The beef issued to the crews in those days was so salty that it had to be lowered over the stern and towed until it was fit to cook, and fresh vegetables ended in the first few days of a cruise. The recruit of to-day has his food cooked by men who have taken a special course in the preparation and serving of food, and his rations are bought by stewards who have had expert training.

A BOXING BOUT

From reveille until 3:15 in the afternoon there is hardly a moment not taken with inspections, drills, or academic instruction, and on Saturday comes the unsparing inspection of the station by the Commandant himself.

They don't think much of the old salt's maxim about "iron ships and wooden men" at the training station, but from 3:15 o'clock in the afternoon until 6 o'clock they put into full force the maxim that "All work and no play makes Jack a dull boy." The athletic fields are crowded and the apprentice seamen have splendid baseball and football teams coached by experts in those sports. There is basketball or track athletics for those so inclined, and sailing and swimming in the bay. Boxing is a favorite sport, and the chaplain stages every week a "smoker," with its boxing bouts, vaudeville stunts, and moving-picture shows. Liberty is granted every afternoon for those who are not on guard; and on Sunday, after church is over, squads leave

for Newport and other points for sight-seeing or visits. Each station also has its bowling alleys and its libraries, and these, combined with every form of athletics, offer as much inducement as the call, "Lay aft—*all* the liberty party!"

At the end of six months' course come the final examinations, and promotion to the grade of seaman, second class; then leave to visit homes, and at its end a well set-up, flat-backed, sun-tanned American bluejacket reports to the Fleet for the rest of his cruise.

THE COLOR GUARD

They have special provisions at every training station, too, for the recruit who shows marked ability along special lines. Soon after one such leaves the detention barracks he is on the road for expert training. At Newport, the Great Lakes station, and at the San Diego, California, training station, the last one established, are special schools for the training of firemen, third class, as the last Naval Bill designated the old-time coal-passer; for yeomen, the clerks of the Navy; and for the commissary, signalmen, and hospital apprentice billets. Musicians are trained at Norfolk and San Diego; and the electrically inclined are sent to either New York or Mare Island, where they have wonderful laboratories in the modernly equipped navy-yards. The shipwrights, blacksmiths, shipfitters, and painters go to Norfolk; and down in Charleston are assembled the machinists, coppersmiths, and those who have chosen instruction in gasoline engines. Farther south, at Pensacola, with its great sweep

of bay and the ocean nearby, we train our fliers for the aeronautic work; and the seamen gunners, the aristocrats of the Fleet, have their school at the Washington Navy Yard. The training of the torpedo and diving experts is carried on at the Torpedo Station at Newport.

In days that did not reckon with these specialist schools the recruits were all enlisted as apprentice boys and served out an apprenticeship as such. They wore on their uniforms a small square or apprentice knot, and were as proud of it as the college boy of his "frat" pin. Since the ratings were changed to apprentice seamen this knot has been discontinued, but many of the officers who have given their best work to the training stations believe that the custom should be revived. When it was in vogue the men on board ship who wore it were the picked men of the crew. Time may see it restored and the initials of the particular training station at which it was won worked in the apprentice knot.

A COMPANY STREET AT GUANTANAMO

XV

WHEN THE SHIPS GO SOUTH

WITH the first signs of winter, when wild water-fowl are winging their way to the South, the ships of the Battle and Scouting Fleets, and of the Control and Base Forces, make ready for their annual cruise to tropical waters. Shortly after the Christmas holidays you read in the newspapers that they have weighed anchors. Then there comes an occasional scant paragraph under the date line of a West Indian port; or from the Canal Zone brief word of the Battle Fleet; or perhaps the silver screen of a motion picture theatre shows our bluejackets at work or play. That is all, until the anchors drop again in Northern ports, that the public knows of this interesting cruise.

Out from the San Pedro base on the California Coast the battleship divisions, the destroyer and aircraft squadrons, the submarine divisions and Battle Fleet's train stand for their southern base. At San Pedro they have exercised in gunnery, made short cruises out to sea to work out a tactical problem, and the men have been kept fit with athletics and shore leave. Usually the course is shaped for Panama Bay, and at times the Battle Fleet steams through the Panama Canal for the naval station at Guantanamo, Cuba. There is always a week devoted to shore leave in the interesting Canal Zone, and always the Fleet championship athletic contests when the

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STEAMING OUT PAST THE CAPES

THE "WEST VIRGINIA" LEADS THE FLEET SOUTH

great bulk of the Navy is assembled together. There is always a fortnight in Panama Bay for fleet exercises, where they test out battle problems, with the enemy represented by a force detached for that purpose. In these fleet exercises the Battle Fleet is reënforced by the arrival of the ships of the other forces from the Atlantic Coast.

The Scouting Fleet, with one division of battleships, the light cruiser divisions, and its destroyer and aircraft squadrons, in the meantime, sets out early in January from its home ports on the Atlantic Coast for its cruise to Guantanamo. Here it spends a fortnight on upkeep, gunnery and athletics before it crosses the blue Caribbean to enter the Panama Canal. For a full month it then merges its activities in athletics, shore leave and gunnery and fleet exercises with the rest of the big fleet before it heads back to Guantanamo for more gunnery exercises, and then home.

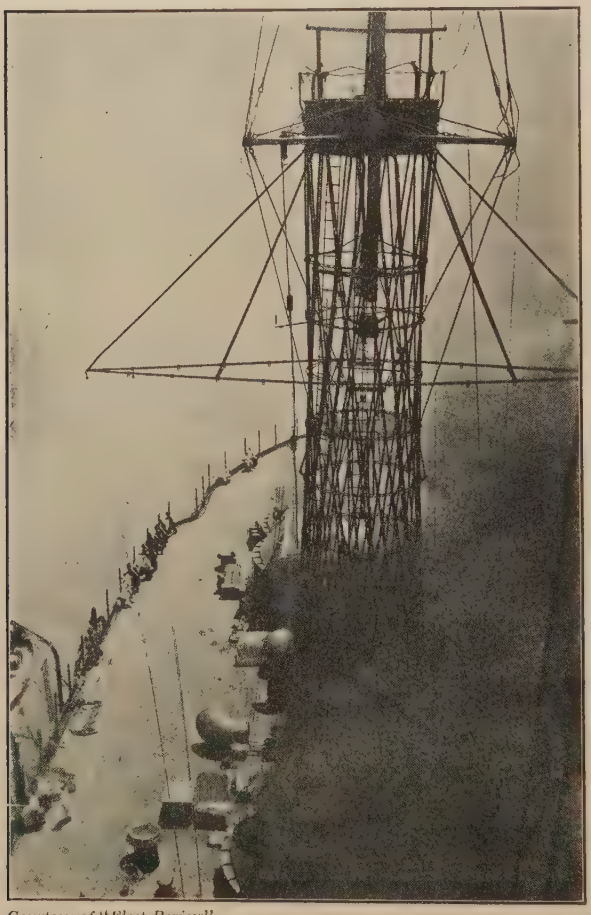
"SHARK-O!"

The main base of the Control Force is in the New London, Connecticut area. This force is made up of Mine squadrons, both mine-layers and mine-sweepers, with their tenders. It too steams through the Panama Canal to join the growing Armada at work in Panama Bay, and then returns to the New London area.

The Base Force, composed of other Mine squadrons, and the Train squadrons assigned to it, goes through a similar routine for its winter cruise and exercises.

A few days out from the home ports a flagship signal changes

the winter uniform of blue into whites in a twinkling; for with four or five days' steaming the Fleet is in the mild airs of the semi-tropics. The trade clouds show up on the horizon in orderly ranks of white. Flying fish break in silvery schools at the bows, and now and then a nautilus or a drift of seaweed slips by. The sky is streaked with plumes of black smoke from the funnels of the Fleet, and the Admiral throws his ships into different formations, drilling them in tactical work and exercises to develop proficiency in maneuvering and seamanship.



Courtesy of "Fleet Review"

LOOKING DOWN FROM THE MAIN TOP

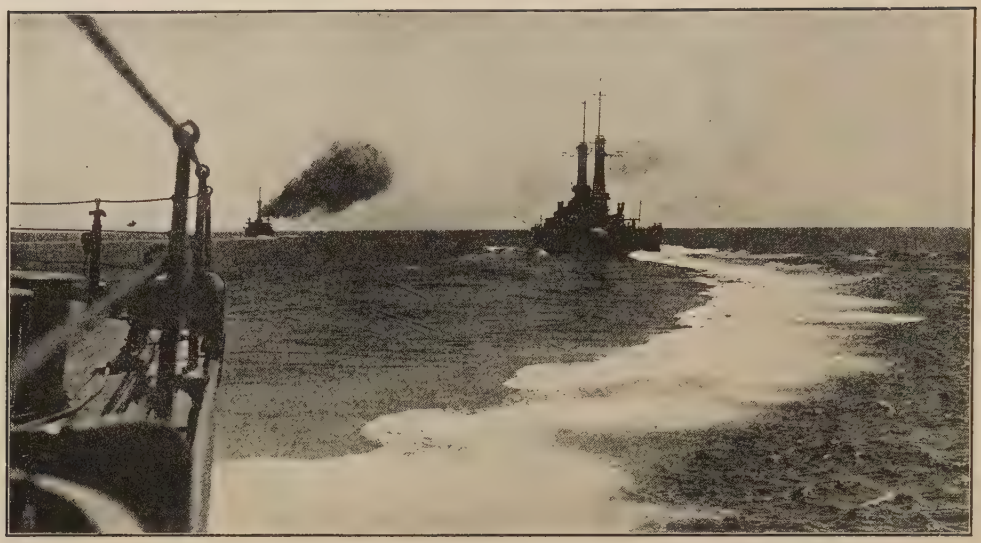
On deck between the drill periods the baseball batteries limber up, officers have matches in trap-shooting, and track athletes practice their starts. Every one is looking forward to the great Athletic Week which makes so welcome a break in the strenuous program of drills and maneuvers.

The modern man-o'-war is not built for comfort in wintry climates. Drills are hard to carry out, and the activities of the ship suffer. The warm climate of the Caribbean is ideal in winter for the hard work ahead.

The harbor of Guantánamo is easy of entrance by day or night, and the ships carry on their maneuvers to great advantage with the bay as their base. War problems are worked out at sea, and battle practice with the great guns is held on the wide stretches that are bare of sail. On shore the largest rifle range in the world, with its mile of targets, gives wonderful opportunities to develop skill with the rifle and pistol. An average

THE FLEET IN GUANTANAMO BAY

OUR SEAPLANES IN CUBAN WATERS



THE BATTLE FLEET MANEUVERS

Courtesy of "Fleet Review"

ARTILLERY DRILL ON THE SAND FLATS

of 2,000,000 rounds of ammunition a month is eaten up with the 3,000 bluejackets and marines each week who fire on the ranges.

Ships land their men for a week or so at a time to live under canvas and carry out a military routine to fit them for landing in tropical countries. The bay is ideal for swimming, sailing, rowing and fishing, and the wide beaches and flats are studded with athletic fields of every kind. The bands go ashore too, and when championship matches are being played there are at times as many as eight bands giving concerts. At night, with the day's work done, unless a gunnery drill interferes, the crews have their own motion-picture shows. At times more elaborate entertainments known as "smokers" are held, with amateur theatrical entertainments, wrestling and boxing bouts, winding up with a fine supper. Carnivals are held on the waters of the bay, and each ship tries to outdo all others in the floats that are a feature of it.

THE OCCUPATION OF VERA CRUZ BY THE BLUEJACKETS AND MARINES OF THE NORTH ATLANTIC FLEET IN 1914

Life is much the same when the combined forces rendezvous in Panama Bay. Here the attractions of shore leave far outweigh those

THE FLEET BRIGADE EMBARKS AFTER MANEUVERS

Courtesy of "Fleet Review"

A SHIP'S LANDING FORCE ASHORE AT GUANTÁNAMO

at Guantanamo. In the passages of the Canal by the various units the crews are not only given a chance to see in detail the greatest achievement of American engineering, but test out the passage of the great canal locks. In the event of war with a foreign power the efficient protection of the Canal is of vital importance to our nation. The military value of the annual concentration of the bulk of the Fleet in this vital area can easily be seen, and is a direct aid to the guaranty of its safeguarding in war.

From the battleship down to the smallest submarine each ship does a tremendous lot of practical work on the Southern cruise. Individual ships are brought to the highest possible efficiency. Squadrons, divisions and all units, when they weigh anchor for the Northern ports, have been welded into one formidable fighting machine. Officers and men have been keyed up to perform the arduous duties that war would demand.

Out in Hawaiian waters destroyers and submarines are carrying out a similar program. The ships of the Asiatic Station, and those of the Mediterranean Squadron follow it, and when the Navy returns to its home ports in April it has spent a winter in which strenuous work and zestful sport have played a part of greatest value to the nation.

Courtesy of "Our Navy"

AIRING BEDDING AT SEA

THE HOSPITAL SHIP "MERCY"

XVI

THE FLEET HAS ITS TRAIN

JUST as an army must have its non-combatant supply trains to feed, clothe, and arm the battalions for the firing line, so the navies have their less showy but invaluable aids to keep the Fleet ready for battle on the seas. The Fleet calls its fuel-ships, both oil and colliers, its transports, tenders, hospital, supply, ammunition, repair, and other auxiliary vessels its Train. The mine-layers and sweepers and mine-depot ships are a separate unit, known to the Fleet as the Mine Force. Without the Train the Fleet could not be kept up to the efficiency that fighting under modern conditions demands any more than a city could exist without fuel, food, hospitals, and stores.

Before the Fleet sallied forth to give battle to its rival, the Train would be busy night and day filling bunkers and tanks with fuel, magazines and shell-rooms with powder and projectiles, and store-rooms

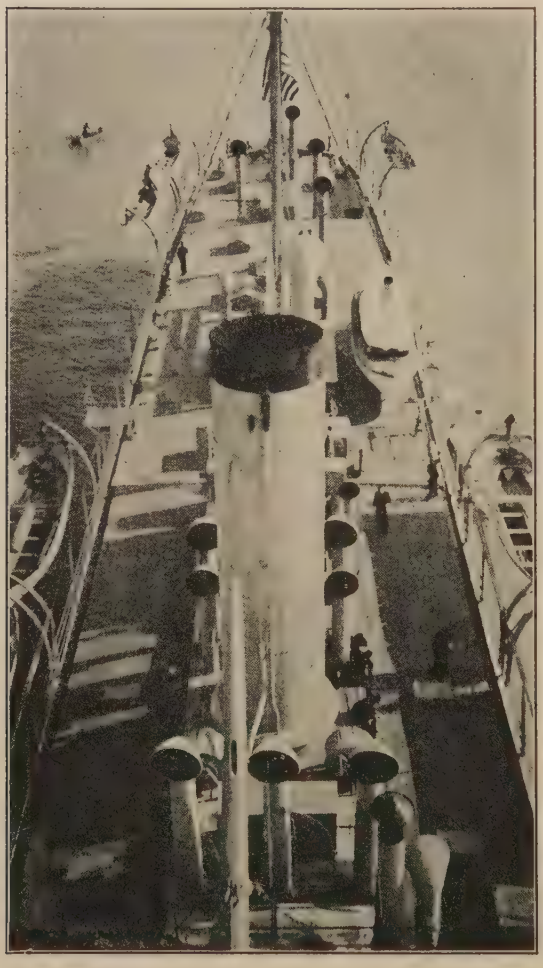
with the immense supplies needed. When the fighting ships finally clash in an engagement that may either settle or have a decisive bearing on the fate of the nations involved, the Train stays well to the rear of the smoke and fire of battle, usually in a well-protected naval base. Its ships are not built for fighting, although, with the exception of the

THE OILER IS VITAL TO THE FLEET

THE TRANSPORT "HENDERSON"

hospital ships, they are armed with light guns as a defense against raiding destroyers and submarines.

When the Fleet comes out from the shock of battle, either victor or vanquished, then the Train steams forth to hasten the work of repairing damages, carrying away the wounded to naval hospitals, and putting the bulldogs of war into trim for another trial of strength.



THE DECK OF AN AUXILIARY

As all destroyers and the latest of American superdreadnoughts are oil-burning craft, and many others use oil as an auxiliary fuel, the oil-fuel ships are among the most important of the Train. The oil-fuel ship is really a large oil tanker such as is used in the merchant service, but it also must be ready to accompany the battle fleet and be prepared to supply fuel-oil to vessels of all sizes, under the worst conditions of wind and sea. The oil-fuel ships can be recognized by the landsman thruogh the Indian names which distinguish them from the colliers of the Fleet. The first of our modern carriers were christened the *Maumee, Kanawha* and *Cuyama.*

In tonnage, length, and draft they are much like our largest armored cruisers, but the Union Jack at their bows, and their coats of gray paint are the only features that outwardly distinguish them from commercial fuel-ships. They can make 14 knots with their modern Diesel engines, and carry 10,000 tons of the precious fuel-oil. The first tank ship, to use the commercial name, the *Arethusa,* was one-fourth the size, carried

one-third the fuel, and with her 10 knots is unequal to the cruising speed of the battle fleet.

Our colliers, despite their grime and dust, bear names famous in mythology, such as the *Jason, Neptune, Nereus, Orion* and *Proteus.* Half of them are fitted to carry fuel-oil in addition to the coal in their roomy bunkers. The colliers take on their black cargoes from modern coal elevators at the seaboard. At sea, when an oil-burner has to be refueled, the oiler and the vessel taking on oil steam at five knots, and the oil is transferred to an open bunker through the oil-hose. In refueling a coal-burner this is usually done at some pre-determined anchorage, for coaling alongside in a seaway is dangerous.

A most welcome sight to the Fleet at anchor in one of our distant bases is the arrival of the supply ships of the Train. Down in their refrigerators are meat, butter, eggs, vegetables, and other supplies that cannot be had in the tropics, and the opening of their cargo hatches brings joy to the ships. The *Culgoa, Celtic,* and *Glacier,* the *Arctic* and *Bridge,* with several auxiliary store ships, accompany the Fleet as an important part of its train. One-fourth of their cargo space is stored with meat kept at a temperature of 15 degrees above zero, while they also carry vegetables and other eatables to keep the mess-tables of the Fleet well supplied while they are away from port.

The destroyer flotillas, which combined make the Destroyer Force, must have tenders to carry extra supplies and for repair work. These tenders, as a rule, operate with the Train, of which they form an integral and important part.

A SUB-CHASER READY FOR DUTY

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PREPARING TO LAY MINES FROM A BATTLESHIP

The Submarine Force operates from mobile bases, which is another term for a tender or mother ship. Each Squadron of the undersea craft has at least one tender acting as its mobile base. Their mother-ships not only carry extra supplies for them and are able to make minor repairs, but the crews of the subs use their more comfortable quarters as a floating barracks. At first we used discarded cruisers and old monitors as tenders for the destroyers and submarines. To-day we have either specially built craft, such as the *Bushnell,* converted merchantmen, or German ships that were seized during the World War, for that duty. They range in speed from ten to sixteen knots, in tonnage up to 14,000 tons displacement, and carry five-inch guns for defense. With roomy holds, machine and repair shops, they are well adapted for their work as mother-ships.

Another ship of the Train to which great attention is being paid is the transport. For years we were dependent on old cargo steamers that were bought at the time of the war with Spain, and hurriedly converted into transports for the marine expeditionary forces. The *Chaumont* and *Henderson* are our only modern, specially designed transports. They average 7,500 tons, have a speed of fifteen knots, carry five-inch guns, and can take on board 2,000 officers and men of the Marine Corps each. The *Henderson* carries the name of a

A SUBMARINE TENDER OR MOTHER SHIP

former Commandant of the Marine Corps who distinguished himself in the Florida Indian Wars, while the *Chaumont* commemorates the French town in which General Pershing had his headquarters as Commander-in-Chief of the American Expeditionary Force. In time of war other ships that are usually not in commission, and converted merchantmen, with speed sufficient to keep pace with the Fleet, would speedily be equipped for transport service.

HOISTING PATIENTS ABOARD A HOSPITAL SHIP

The *Medusa* and *Vestal* are fitted out for repair work that cannot be done aboard a battleship or cruiser away from the navy yards. They are actually floating machine shops with every facility of forge and lathe to do the work, and the Fleet could ill spare them.

Other ships of the Train are known as ammunition ships, carrying shells and powder for the Fleet. There are cargo ships, loaded with miscellaneous cargo; and other ships are specially equipped for surveying work. These types range up to 12,000 tons, and, while not fighting ships, usually carry five-inch guns for defensive work. Without them the Fleet would be seriously hampered in its operations.

There are no ships performing more interesting work than that of the mine-layers and mine-sweepers. The possibilities of sinking ships by mines sprang from the fertile mind of an American, David

Bushnell, at the time of the Revolutionary War. In the Civil War twenty-five ships were lost by mines alone, planted in Confederate waters. Our principal mine-layers, armed with five-inch guns, began their naval careers as cruisers, but as mine-layers they are well equipped for their new work.

Courtesy of "Our Navy"

THE REPAIR SHIP "VESTAL"

A submarine mine is a metal case filled with an explosive, and moored near the surface. Small craft can pass over the mine fields, for they are not wasted on the small game of the sea. When a larger ship, with greater draft, passes over a mine, however, its hull pushes in a plunger which detonates the guncotton or other

THE FUEL SHIP "PROTEUS"

high explosive and the mine is exploded against the hull, either sinking or crippling the unlucky ship. The mines, hidden from spying aircraft or watches on deck, have a great moral effect. When struck they throw a column of water as high as the masts of the tricked vessel.

In recent years our Navy has done much to perfect the mine. In a great sea fight the fleeing fleet drops its store of mines overboard in the path of the pursuing ships.

As a defense against the danger of mines the mine-sweepers tow drags behind them, and these set off the detonators of the mines so that they explode without injury. Old destroyers have been pressed into this service and, with trawlers, tugs, and launches, make good mine-sweepers. The Mine Force of the present Fleet has jumped into a very important rôle of naval warfare.

Aptly named are the *Mercy* and the *Relief,* for they are the hospital ships of the Train. As hospital ships are immune from capture or attack they are the only vessels of the fleet that do not carry armament for either attack or defense. One of the finest hospital ships afloat is the *Relief.* She was built in 1920, a modern floating hospital. Prior to her time our hospital ships were simply converted merchantmen. Her hull has been specially designed to prevent rolling, and in that way make life more bearable for the sick and wounded in her care. She is 460 feet long, with a beam of 60 feet and room for 500 patients in time of war. Meals can be served hot on a steam table that is rolled along deck and carried to other decks by elevators. There are a diet kitchen, an X-ray room, sterilizing apparatus, contagious disease

THE COLLIER "JUPITER"

THE AIRCRAFT TENDER "WRIGHT"

wards, and laboratories and other special rooms equipped with the latest devices of surgery that the modern hospital has on shore.

The Navy also has its fleets of yachts and tugs which are part of the Train. The most famous of the yachts is the *Mayflower,* the President's official yacht, which was formerly J. Pierpont Morgan's pleasure yacht, the *Corsair.* Another was the *Yankton,* the official tender of the Commander-in-Chief of the Atlantic Fleet, and formerly the *Cleopatra,* Sarah Bernhardt's famous yacht. The *Scorpion,* which did valuable relief work at the time of the great Messina earthquake in Sicily, in 1908, is the station ship for the American Embassy at Constantinople.

The Navy has also a goodly flotilla of tugs, most of which bear such Indian names as *Apache, Arapaho, Choctaw,* and *Sioux.* These useful midgets tow lighters and barges filled with ammunition and supplies, help the big ships in and out of their navy-yard berths, and do a multitude of errands and hard work for the navy-yards, foreign stations, training stations, and the Fleet.

THE "EAGLE" BOATS ARE HANDY ON PATROL

Courtesy of "Fleet Review"

INSTRUCTION WITH SEMAPHORE AND WIGWAG

XVII

HOW THE SHIPS TALK

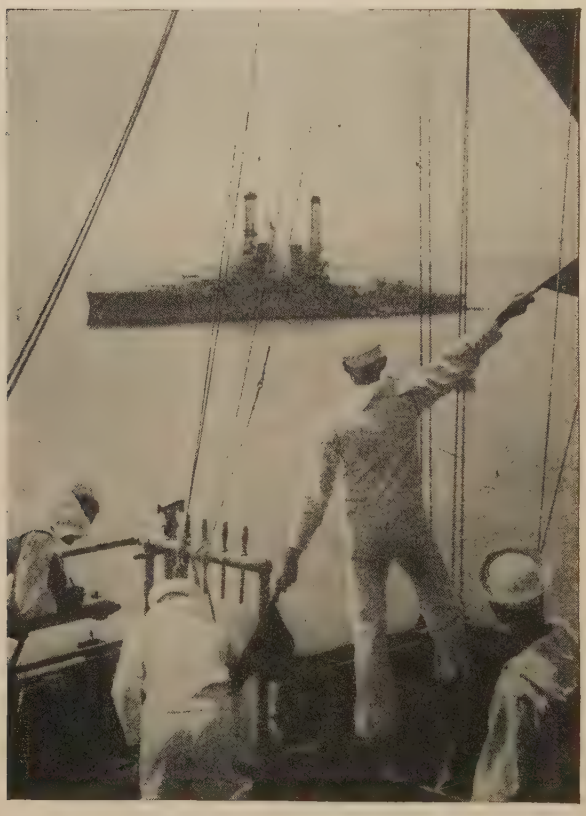
THE ships that sail the seas are great talkers. They not only have their ways of sending messages of distress and other important news, but they love to gossip on matters of much less consequence. Of all ships the man-o'-war is the greatest talker, for the Fleet bustles with life in port or at sea, and the navies of the world talk fluently in many languages of which the peaceful merchantman has barely mastered the A B C.

The ships of the American Navy carry on their talk by day or night: anchored within the toss of a ship's biscuit of each other or hundreds of miles apart; on a day sparkling with sunshine or when the fog lies like a great gray blanket on the sea, and all with the same ease. Within sight of each other they use their visual signals, and when the fog rolls in and hides them from each other their booming whistles carry on the talk with long and short blasts. Even the submarines, darting beneath the surface, have their bell warnings so that the little undersea craft may avoid collision.

The visual signals are in constant use and are the most varied of all the odd tongues that carry on deepsea talk. Flags and semaphores keep up a lively conversation by day, and when night sets

in the man-of-war has its Ardois lights and blinkers, its searchlights and rockets.

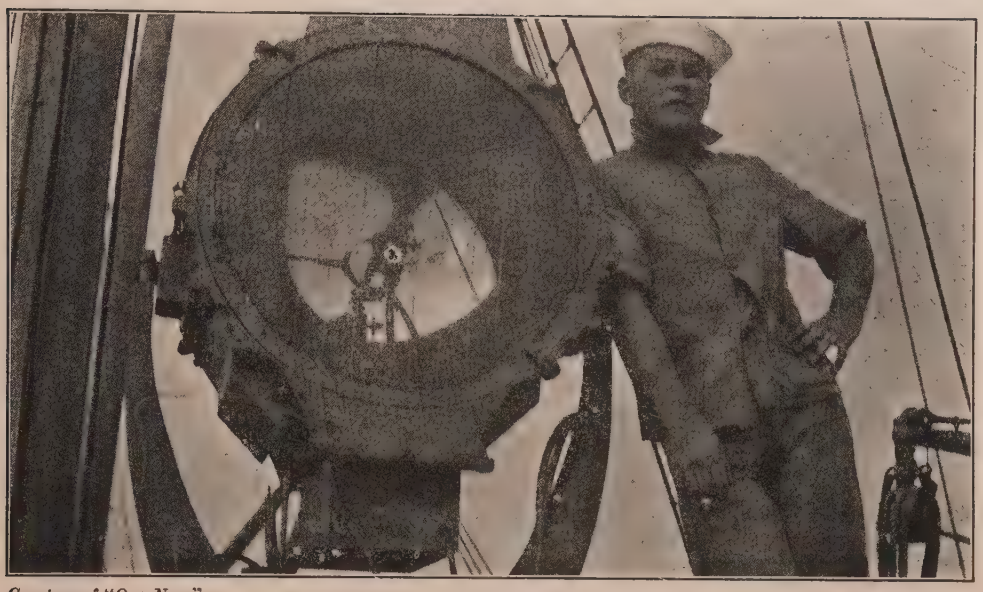
At the ends of the flying bridges that span a modern man-of-war there was, not so long ago, an upright bar from the top of which stubby arms waved at all angles, for all the world like the arms of a lively Jumping-Jack. These were the semaphore signals and they were made of either wood or metal and worked by small levers. With the same movements a sailorman, with a small red and yellow flag in either hand, can send the same message; and when the ships are within reasonable signalling distance they talk with the hand semaphores. Before the semaphore system was perfected this kind of visual signaling was done by flag waving or wigwagging. The semaphore is faster, and when the distance is too great for the waving semaphore arms to be distinguished the message is sent by blinker or flag hoist. In the semaphore each angle of the arms is a letter. In the wigwag there are three motions, one to the right, one to the left, and one to the front. Each motion to right or left represents the dots and dashes of the telegraphic alphabet of the Morse code; some letters require four moves.



SIGNALLING TO A BATTLESHIP

When the marines held Guantánamo as a base for Admiral Sampson in 1898, their signalmen wigwagged at night to the ships in the harbor with an ordinary lantern, while the Spanish sharpshooters volleyed at the signalmen standing upright on the parapet of their trenches. With a lantern placed inside a box with a sliding lid you

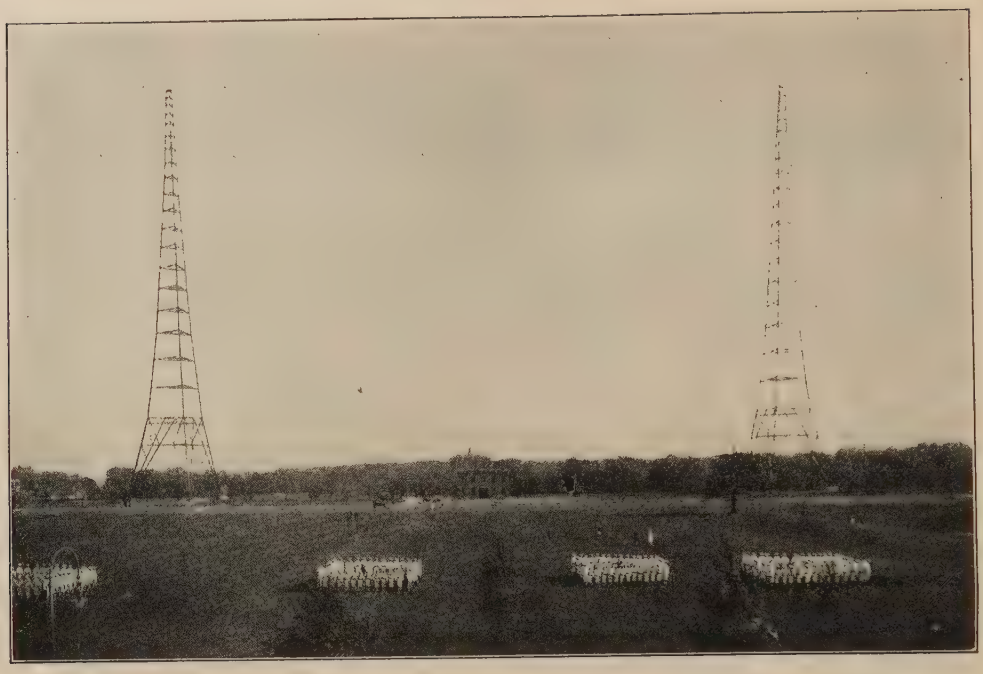
SIGNALING A MESSAGE TO THE FLEET



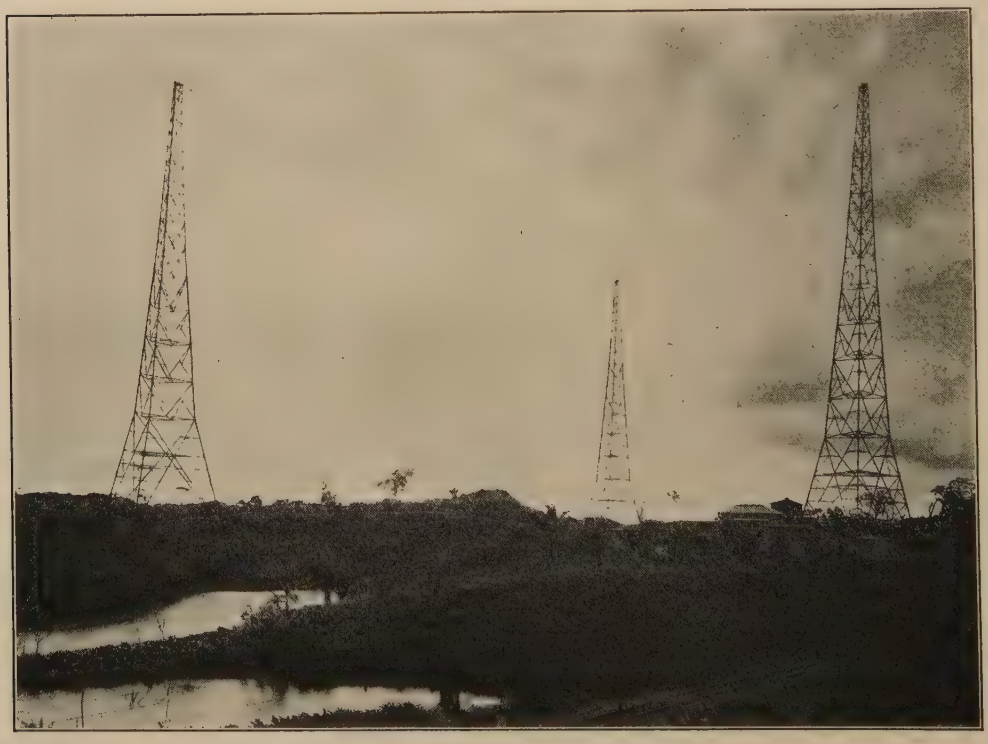
Courtesy of "Our Navy"

A BATTLESHIP SEARCHLIGHT

A FLAG HOIST DRILL



RADIO TOWERS INLAND TALK WITH THE FLEET



THE DARIEN RADIO TOWERS AT PANAMA

can carry on an animated conversation by fastening a cord at the top of the sliding lid, and then lowering the lid quickly for the dots, and slowly for the dashes of the Morse alphabet.

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THE BRIDGE OF THE FLAGSHIP

For distance where the hand semaphore may not be adequate, and always when the Fleet is maneuvering at sea or in battle, signal flags are hoisted. These hoists, as they are called, can be seen for miles, and many sentiments that have gone down in history were first flown in battle from the yard-arm of a flagship. It was Nelson at Trafalgar who ordered the hoist that read: "England expects every man to do his duty!". And it was Perry at Lake Erie who flew the signal: "Don't give up the ship!"—the dying message of Captain Lawrence of the *Chesapeake*.

For the flag hoists the twenty-six flags of the International Code, one for each letter of the alphabet, are used. With their reds and yellows, whites and blues, they are as gay as the flags of rival schools at an athletic meet. All navies, and the merchantmen of all nations, use the International Code; so that an American schooner, meeting a Norwegian bark in mid-ocean, can give the latter her latitude and

longitude and then run up a hoist asking for the loan of a cake of ice. Each navy, too, has its own secret code and uses the international flags by hoisting them under its own code pennant.

The code book of a navy, if it should fall into the hands of another government, might spell disaster if those two nations should ever meet in war. So, in peace time as well as war, the code books are guarded jealously. Their loss is a courtmartial offense. The signal code book is weighted with lead and if a ship is captured it is thrown overboard.

Every morning at seven o'clock the flagship makes the time and uniform signal; and at ten o'clock each ship in the Fleet makes a hoist that informs the Admiral of the number of sick and absentees under his command. Every noon another hoist tells him how much fuel and water each ship has used in twenty-four hours, and how much is left in her tanks and bunkers, and, at sea, the latitude and longitude.

When night fell the red and white lamps of the Ardois at masthead winked out their messages, and each ship, as it read them, passed them on to the ships astern. Yard-arm blinkers have supplanted the Ardois just as the semaphore did the wigwag, for the blinkers flash out the dots and dashes in short and long displays faster than the Ardois. They are worked from the bridge by an electrical keyboard, the press of a button showing the letter up aloft. With a fleet at anchor at night it was a fascinating sight when the red and white lamps of the Ardois was spelled out their news and the white blinkers were winking like so many fireflies against the black of night. The semaphore arms, lighted by bulbs, swept like growing jewels at the ends of the bridges, and from the searchlight platforms the great white beams of the searchlight moved back and forth or threw their soft light up against a bank of cloud.

If a message must be sent a great distance, perhaps to a scout far out at sea, the great searchlight draws its giant finger against the somber background of the sky, calling the scout by its code letter. From the black ocean leaps up the answering "Aye! Aye!" of the scout. Off goes the message, flashed by the opening and closing of the searchlight's shutter. The signalmen lay their telescopes in the quarter from which the answer is to come while the recorder, pad and pencil ready, writes it down in his signal book. The latest of our ships now use small searchlight lanterns on the bridge, and with their blinding lights messages have been sent for great distances. With a ship of the Atlantic Fleet lying off the entrance to the Panama

Canal, and a ship of the Pacific Squadron lying at the other entrance, by throwing their powerful searchlight beams across Culebra Cut on a dark night messages have been sent with comparative ease.

There are other lights used at night by all ships for special purposes, such as code signals and signals of distress. These are the Very night signals. A cartridge much like that used in a shotgun is fired from a specially constructed pistol, and the rocket that soars up in the night is followed by other cartridges that send out their message in red and green stars like those of a Roman candle.

The greatest of all methods by which ships talk to each other, or to shore stations, is that of the marvelous radio. The Navy calls it the Radio because the energy is radiated or sent out into space and the messages are radiograms. Nowadays with the radio communication vessels several hundred miles apart can talk with greater ease than the old frigates could lying in the same harbor. Every day the ships at sea get their radiograms of the world's news, and those giving the baseball and football scores are circulated through the ships with great enthusiasm. To make this wonderful communication not only every ship in the Navy has its radio, but the Navy has stations along the coast to receive and transmit orders and messages.

There is little evidence to show that a ship is fitted with radio except for the slim aerial wires, or antennæ, that hang from the top of the highest mast. The radio room is out of sight behind the heaviest belt of armor, and our battleships are now fitted with military, or fire control, masts, so constructed that no single shell can smash them and thus destroy the radio.

King of all the radio in the Navy is the great station at Rádio, Virginia, which rears its twin radio towers within sight of the Navy Department and flashes its messages to ships 3,000 miles out at sea. Night is more favorable for radio than daytime, for then messages are sometimes sent double the distance. The distance varies with conditions, some of which the experts cannot explain, but the power of the instrument and the height of the mast or tower supporting the aerials are great helps for distance.

The radio has not only become a great factor in war but a mighty agency in peace in the calling of ships to a vessel in distress. The magic letters S. O. S. are sent out repeatedly by the doomed ship as warning that a call for help is coming. All ships within receiving distance shut down their radio and listen anxiously for the message that will give the ship's name, position, and the nature of her distress. Then from every quarter they crowd on steam to

rush to her assistance, repeating her message so that no ship within reach of her will miss the call. Distress signals are also shown at night by a special International Code signal, by gun-firing and by the rockets.

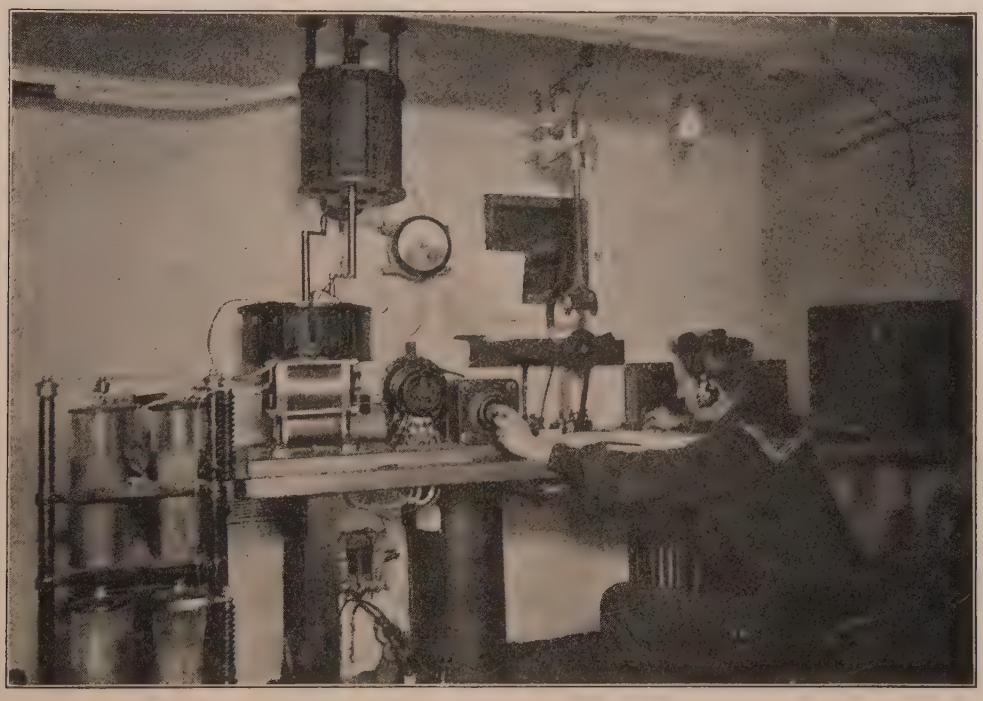
With all this wealth of talk by flag and light, by wireless and rocket, by whistles and semaphores, the ships are not content. They must have signals beneath the sea for use in thick weather and at

A LESSON IN RADIO

night, and so we have submarine bells in all lightships and other aids to navigation. Ships love to sight these aids in clear weather to check up their positions, but at night they may be a source of danger and the warning of the submarine bell is welcome.

The sending set of the submarine bell is an ordinary bell, smaller than a ship's bell, which is kept ringing by electricity. On the passing ship is the receiving set of two small iron tanks filled with water, one on each side of the ship well below the waterline. In each is a microphone electrically connected with an indicator box in the ship's pilot

house. The bell sound coming through the water passes through the skin of the ship, enters the water in the iron tank and is picked up by the microphone. It then enters the indicator box which has two telephone receivers. Switches in the indicator box allow the operator to listen to the sound picked up by the port and starboard microphones. By the loudness of the tone the operator can tell on which side of the



THE RADIO ROOM OF A BATTLESHIP

ship the warning bell is ringing. The ship is swung in that direction, and when the sound is heard equally on both sides he knows that the ship is pointing toward the bell.

By the skill and rapidity with which the signalmen of a ship make and read signals its smartness in the Fleet is rated. Mistakes or slowness in signals make the offending ship a marked one and from the flagship comes a sharp reprimand, for in battle or emergency human lives hang in the balance when the signalmen go astray. The making of expert signalmen begins at the naval training stations in the selection of keen and alert boys for the signal squad. Each ship has its signal officer, signal chief quartermaster, and quartermasters and signalmen. A flagship carries a squad of twenty-odd, and night

and day a relief is stationed on the bridge. Along the bridge is the signal locker, with each signal flag hanging in its own rack. Each alphabet flag is known by a name such as *dog, cat, quack, rot.* The reason for this curious custom is that when an order is shouted for *D* or *C* it is easy to make a mistake. Instead the order goes for *Dog* or *Cat* and no mistake is possible.

The officer in charge orders a certain signal to a sister ship. "Bear a hand there with the Quack!" sings out the quartermaster. Out from its rack goes the *Q* of the alphabet, and its top is toggled on and its bottom snaphooked on the signal halliards in less time than the telling takes. Then away it swings to the yard-arm up aloft.

MASKED IN SILENCE

Each year the signal squads have a keen competition for the Correspondent's Cup, presented to the Fleet by the special correspondents who made the famous cruise around the globe with the Fleet.

The Fleet is at anchor. There is not a sign of the impending departure from the peaceful harbor in which the ships lie like so many immovable gray fortresses. A hoist of gaudy flags, giant butterflies in the whipping breeze, breaks out from the flagship. Boatswains' gangs swarm on the forecastles making ready the anchor gear. With clanking of engines and thunder of anchor chains in the hawse pipes the anchors are hoisted and catheaded. The Fleet gets under way. The flagship, with her four-starred blue flag at masthead, leads the van. String after string of signals break out from the yard-arm of the flagship, giving the course, speed, and formations. The ships repeat them down the long column. Out they go to sea with no confusion, no tumult and shouting, only the gay hoists of bunting working the will of the Admiral with his proud ships.

INTERNATIONAL CODE FLAGS AND PENNANTS

ENSIGNS AND NATIONAL MERCHANT FLAGS

Courtesy of "Collier's Weekly"

THE FLEET LEAVES HAMPTON ROADS

XVIII

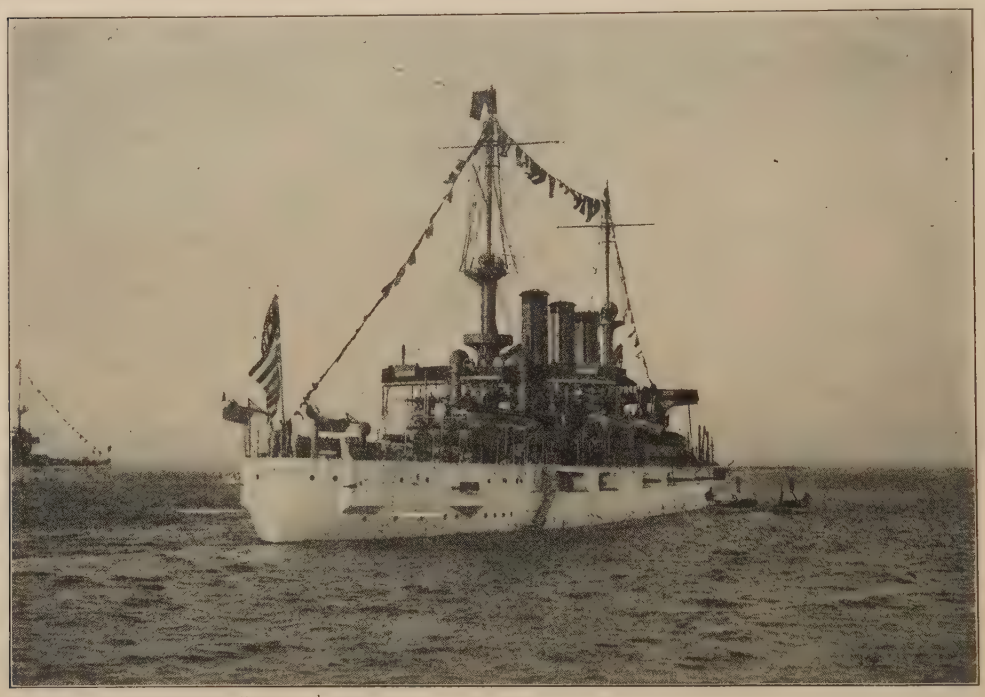
WHEN THE FLEET WENT ROUND THE WORLD

IN the history of all the navies of the world there has never been anything so colorful as when the American Battle Fleet belted the globe. It was not only the greatest fighting force that had ever sailed under the American flag, but it was the longest cruise the fleet of any nation ever made. Sixteen first-class battleships, the flower of the Navy, with 14,000 officers and men, logged a total of forty thousand miles on the fourteen months' cruise, showing the Stars and Stripes in the ports of nearly every one of the world's great nations.

The value of this remarkable cruise can hardly be estimated. It proved to a doubting world that the United States was one of its leading naval powers. It strengthened us in countries that were friendly, and in the few where our relations were not then all that every American could desire it left a lasting impression that made for great good. It made the Battle Fleet, as it was officially known, a welded unit that came home stronger in gunnery, more skilled in maneuvering on the high seas, and more efficient, from the main trucks to the engine-rooms. The countries of the world strove to excel each

other in hospitality, and the cruise was crowded with stirring and unique incidents.

Out from historic Hampton Roads the fleet steamed on December 16, 1907, President Theodore Roosevelt reviewing the column from the *Mayflower* as it passed out beyond the Virginia Capes. Fighting Bob, as Rear-Admiral Robley D. Evans was affectionately known to the American people, was in command on the bridge of the flagship



Courtesy of "Collier's Weekly"

THE FLAGSHIP "CONNECTICUT"

Connecticut. The first of the four divisions, each commanded by a Rear-Admiral, comprised the *Connecticut, Kansas, Vermont,* and *Louisiana.* Then came the *Georgia, New Jersey, Rhode Island,* and *Virginia.* In the third division came the *Minnesota, Ohio, Missouri,* and *Maine.* In the last were the *Alabama, Illinois, Kearsarge,* and *Kentucky.* Each of the ships steamed 400 yards astern of its leader. At times the Fleet steamed in two columns; again in columns of four; and all day long on the cruise signals from the flagship sent the divisions hurrying into the formations that a battle fleet must be expert in.

The first port in which anchor was dropped was at Trinidad, where

the ships celebrated Christmas with the thermometer at 90 degrees. Each ship was dressed with tropical greens from stem to stern, from masthead to waterline, and even the turrets and their frowning guns were wreathed with them. The day was given to boat races and other sports, and to visiting parties that brought back to their ships the first installment of pets that, by the time the cruise was ended, would have stocked a fair-sized zoo. The torpedo flotilla, the dispatch boat

Courtesy of "Collier's Weekly"

NEPTUNE INITIATES HIS SUBJECTS

Yankton, the repair ship *Panther,* and the *Glacier* and the *Culgoa,* with supplies and coal, joined the fleet in this port.

Here came the first interchange of official and other courtesies that followed the fleet around the world; and then up anchor and the Sweet Sixteen, as they were nicknamed, went "rolling down to Rio."

Two great events marked this run, with the celebration of New Year's Day at sea, and the crossing of the Line. Every sailorman has two great ambitions—to cross the Equator and round Cape Horn. The first of these two came true on January 6, 1908, when the Battle Fleet entered Neptune's domain. The ceremony that took place on the *Louisiana* was typical of that on the other ships. As Neptune

Courtesy of "Collier's Weekly"

PRESIDENT ROOSEVELT AND ADMIRAL EVANS ON THE FLAGSHIP

boarded her with his wife Amphitrite and his court, a red flag with a white sea-serpent was broken out at the main, for Neptune was in command. Neptune wore a scarlet robe with sea-serpents embroidered on it, and a beard of golden hemp fringe, and carried a trident. His wife was in white with a sea-green hat, and with her was her cat. When a landlubber enters the waters that Neptune rules he must be duly initiated.

Courtesy of "Collier's Weekly"

MAKING LIBERTY AT RIO JANEIRO

Two tanks had been erected on the forecastle. Over each tank was suspended a chair. With much ceremony the victims were led to the chairs, where they had a mock shave and their heads were powdered. At a signal they were dropped from the chairs into the tanks, where two of Neptune's court seized and ducked them in the brine, to the huge delight of the crew. Only those who had at some time crossed the Line were exempted from the initiation. All through the quaint ceremony an enormous gull hovered over the ship, and the sailors greeted it as a happy omen. At night a barrel filled with oakum and oil and tar was lighted and dropped from the stern of each battleship, in token of Neptune's return to his kingdom. The new subjects of Neptune were given certificates bordered with deep-sea designs and the mock Neptune with his wife and court went back to their old posts in the ranks of the Fleet.

In Rio de Janeiro, which all sailormen will tell you is the most beautiful harbor in the world, the Battle Fleet was royally entertained for two weeks. Each day 2,000 bluejackets and marines went

ashore, and, as one of the officers expressed it, they were literally stunned by the hospitality of the Brazilians.

On the way to Punta Arenas, Chile, the next port to call, came one of the memorable incidents of the cruise. Off the River Plata the Argentine Fleet steamed out to meet our ships. Guns barked, marine detachments presented arms, and the signal yards were bright

Courtesy of "Collier's Weekly"

A BIT OF NAVIGATION IN THE STRAITS

with the greetings of the two fleets. No such honor had ever before been extended the fleet of any nation.

Now the crews shifted from white to blue, as the airs grew bracing. One day the columns steamed into Possession Bay, with the mountains of Patagonia sheltering it, and on the first of February dropped anchor at Punta Arenas, Chile, for coal and liberty. It was an odd port, with its tongue stretching out into the Straits of Magellan, and one rarely visited by an American man-o'-war. Here two Chilean cruisers, another graceful compliment of the South American countries, joined to lead the Battle Fleet through the Straits.

The Straits of Magellan have an evil name with sailor folk. They are 360 miles long and their width runs from a mile and a half to

Photo by Paul Thompson, N. Y.

READY FOR REVIEW IN SYDNEY, AUSTRALIA

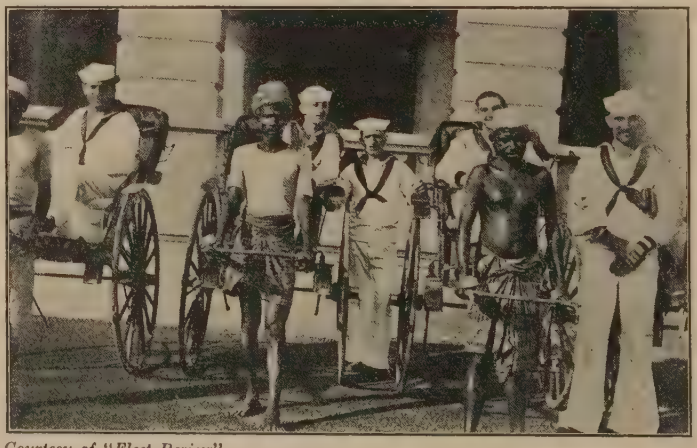
A STREET PARADE IN MELBOURNE

SIGHTSEEING IN CHINA

twenty-five miles. Never before had a fleet of steel monsters passed through the stretch of water, with its heavy fogs, its treacherous currents that run like mill-races, its shores capped by giant glaciers and snow-topped mountains. In daylight the run was made in safety, until the long, zigzagging column had left the scene of weird beauty for the heaving swells of the Pacific. The horn had not been rounded, for only sailing ships take that long route now.

What the Battle Fleet remembers as the most unique welcome of the cruise followed. In and out of the crescent-shaped harbor of Valparaiso, Chile, the fighting machines, now headed north, passed. The shores were black with people, and on the terrace of the Chilean naval station were stretched the cadets in white, forming the word *Welcome.* Salutes were exchanged, each battleship roaring out its salvo, and President Montt of Chile reviewed the moving fleet from the deck of a Chilean warship.

At Callao, Peru, the Battle Fleet stopped for a stay filled with a great bull fight, trips to the top of the Andes and other points. Wherever they went our men found the Peruvian and American flags intertwined.



Courtesy of "Fleet Review"

OUT FOR A RICKSHAW RIDE IN COLOMBO

Two days ahead of the Navy

Courtesy of "Scribner's Magazine"

THE AMERICAN FLEET IN THE STRAIT OF MAGELLAN DURING ITS WORLD-CRUISE, 1907

From a painting by Henry Reuterdahl, in the Naval War College

Department's schedule the ships came to Magdalena Bay, Mexico, for a month's hard work at battle practice. They had been reviewed by the Presidents of the United States, Brazil, Chile, and Peru.

Then came brief stops at San Diego and other California ports, and on May 6, 1908, the Battle Fleet passed through the beautiful Golden Gate and into the crowded harbor of San Francisco. The actual steaming time from Hampton Roads to the Golden Gate for 13,750 sea miles had been 61 days and 19 hours. Without the time given to maneuvers and social duties the Battle Fleet had proved to Washington that, in time of need, it could have been sent into the Pacific in 78 days.

Admiral Evans had given up his command just prior to his ar-

GIBRALTAR WAS THE LAST FOREIGN PORT

rival at San Francisco. Up to Seattle and Tacoma went the Fleet, and a month later, under Rear-Admiral Charles S. Sperry, it sailed for Honolulu. There was a week's stay at this American outpost, with its wonderful scenery and water sports, and then on to Auckland, New Zealand. Here were trips to the famous geysers and the warlike dances of the Maori tribes for the liberty parties, and then came the Australian ports of Sydney, Melbourne, and Albany.

The rifle experts of the Battle Fleet shot matches with the pick of Australia's noted riflemen, and at Melbourne the *Louisiana,* holder of the Battenberg Cup, defeated the crack Australian crew of the British cruiser *Challenger,* which had not until that time known defeat. At Sydney and Melbourne the brigade of sailors and marines were reviewed by the Governor of Australia in a land parade.

Then came strange waters, unfrequented by the battleships of any nation, as the Fleet ran through the Lombok and Macassar

Straits, names made famous by Kipling, into the Strait of Basilan, the entrance to our Philippine waters, past the American post at Zamboanga and up to Manila. Manila gave itself up to carnivals and other forms of celebration in which Americans, Spaniards, and Filipinos joined; and then up anchor for Yokohama, the favorite seaport of Japan.

The Imperial Government of Japan made the stay of the Battle

Courtesy of "Collier's Weekly"

THE FLEET COMES BACK TO HAMPTON ROADS

Fleet in Japanese waters one memorable for the lavish scale of hospitality and the many courtesies shown to officers and men. The visit had strengthened the old friendship between the United States and the Empire of the Mikado, and the United States Navy had another diplomatic victory to its credit.

From Yokohama the ships returned to Manila for target practice, and one squadron went to Amoy, China, to pay that great nation a visit. The entire Fleet assembled next at Colombo, Ceylon. Christmas, the second since the Fleet had begun its task of encircling the globe, was celebrated at sea during a run of great interest through the Indian Ocean, the Red Sea, and the Suez Canal.

At Port Said the Fleet separated, to visit the Mediterranean ports of Smyrna, Genoa, Algiers, Marseilles, and others, giving to Asia, Africa, and Europe a demonstration of the part that the Navy of the United States played in the world's affairs. The great earthquake at Messina, Sicily, occurred during the stay at Port Said, and several of the ships steamed close to the ruined city on the shores of the Strait of Sicily ready, as an American fleet has always been, to give aid to a stricken people.

In the shadow of the famous Rock of Gibraltar the Fleet showed its formidable strength, and then steamed westward, out of the inland sea to the Atlantic at the end of January.

Rear-Admiral Charles S. Sperry flew his two-starred flag from the flagship *Connecticut* when the Battle Fleet passed in review before President Roosevelt at Hampton Roads three weeks later.

The cruise of the Battle Fleet had gone down into history.

Courtesy of "Collier's Weekly"

WHEN THE FLEET WENT ROUND THE WORLD

THE SPECTACLE REEF LIGHT STATION

XIX

SENTINELS OF THE SEA

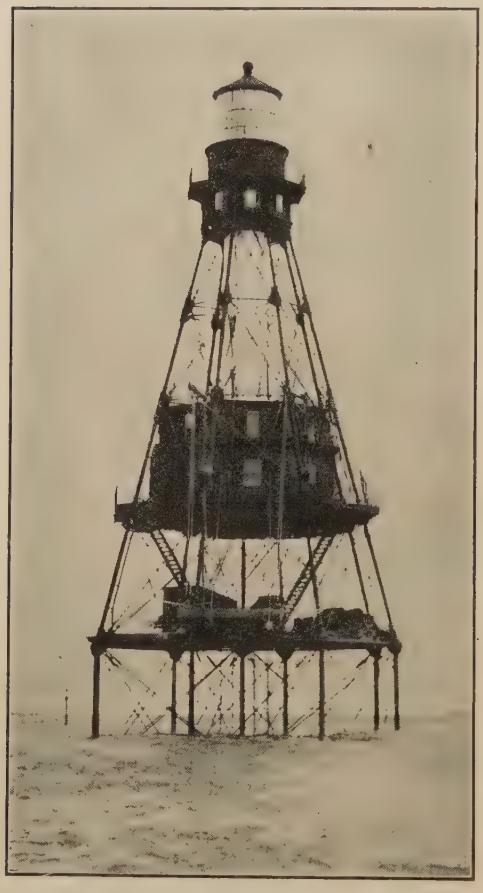
WHEN a ship is at sea her captain lays her course by the stars at night and the sun by day, but when from the crow's nest the cry is raised: "Land ho!" then he looks for some familiar landmark. No harbor entrance is without them, no hidden shoal or dangerous reef that is not marked in some way, or else the coast would be strewn with the rotting hulks of liners and merchantmen, and every gale that swept the coast would leave its toll of lost ships and drowned in its wake.

So the captain sweeps the coastline with his glasses until they show the image of a stout-hulled lightship with its stumpy masts, or of a lighthouse's tower rising sheer from the sea on its base of hidden rock, or perched high up on some commanding point of the mainland. If it is at night he can tell from the nature of the light that they carry which of the hundreds on the coast it is. It may sweep its beam of light in a slow-moving circle, or hold straight out to sea in a fixed lance of white. Again it may wink its friendly eye over the water, shutting it ten seconds out of every half minute or so.

The story of these sentinels, beacons by day, and gleaming by

THE FAMOUS MINOT'S LEDGE LIGHT

night, is one of romance and perils, of timely warnings and of tragic wrecks, of wintry gales and dangerous fogs, and above all of the triumphs of American engineers. No other nation has such a great and varied shore to protect in the interests of the shipping of the world, and no other has lighted its coastline in the face of such obstacles. Here a stretch of rockbound shore, and farther south leagues of sand-dunes, which give way still farther south to the reefs of coral where the West Indian hurricanes bring death and ruin in their path: so runs the Atlantic Coast. Cliffs rise sheer from the water's edge on a shore where fogs hover for weeks at a time, and hidden pinnacles thrust their fingers of rock upward: so runs the Pacific Coast. The Philippine archipelago is threaded with swift currents and hidden reefs, and the waters that wash the shores of Porto Rico, Hawaii, and Alaska are under our care.

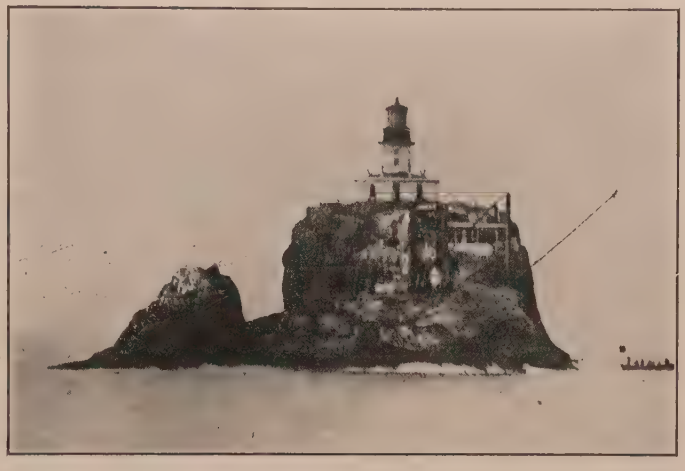


THE SCREW PILE STATION IN FLORIDA WATERS

As far back as 331 B.C. the ancients were alive to the need of aid to their shipping and they built the first of lighthouses, the famous Pharos, one of the ancient wonders of the world, to guide seafaring men into the harbor of Alexandria. Its huge bonfire of wood burned all night long for a century and a half.

The first American lighthouse was built at the entrance to Boston Harbor by the Province of Massachusetts in 1715, and it was not until 1789 that the Government took charge of the lighting of our coasts and inland waters. The United States Lighthouse Service is now charged with that work, with its land and sea marks to aid the navigation of vessels. In Panama the Canal Government looks out for its safeguards and in the Philippines the Insular Government.

The two most famous of our lighthouses are, curiously enough, separated by the width of the continent, and the third is halfway between. The Minot's Ledge Light, off the coast of Massachusetts, yields to no other light in the world in its fame, not even to the Eddystone Light in England, after which it was patterned. There is scarcely a forecastle in the Seven Seas that has not its tale of Minot Ledge. Every engineer knows it as one of the greatest victories ever wrested from the sea and its fury. Its base is that of a hidden reef, long the terror of mariners, and the most seaward of a clusters of reefs that has given that part of the New England coast a dread name.



THE TILLAMOOK LIGHT IS A MILE OUT TO SEA ON THE OREGON COAST

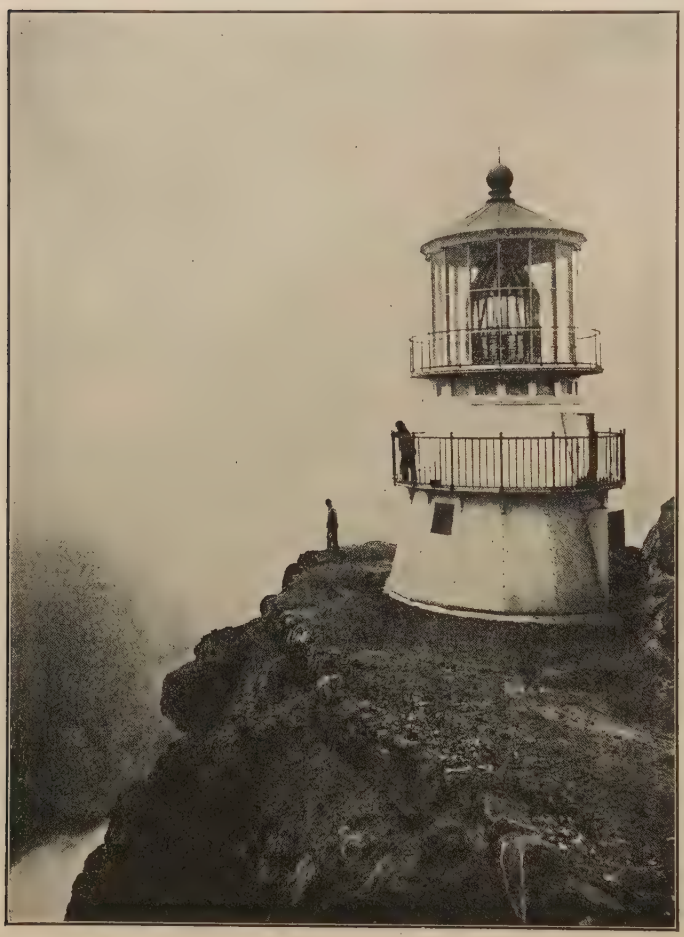
The first tower erected there in 1851 did not survive the first gale, and Minot's Ledge went on exacting its deepsea toll of ships and men. Then it was decided to build a new beacon of stone, with the conical tower of the Eddystone Light as a model. It was five years before it was finished and anchored to the hidden reef; and then the gales which swept the ledge were routed by American skill.

On the Pacific Coast there was no more evil point for shipping than where the Columbia River empties into the cliff-bound shore line of Oregon. For 1,500 feet above the water's edge the cliffs rear their heads. At their bases the sea is studded with rocks and reefs, and fogs haunt it, making it a veritable deathtrap for passing craft. To build on the mainland was to shroud the light in heavy fogs or in the smoke of forest fires, so it was decided to place the light on Tillamook Rock, which rises a scant hundred feet above water one mile out to sea. The waves that broke with shattering force across it defied the engineers in vain, and its final erection was a triumph over obstacles that seemed to mock the toil of men.

Four men were finally landed on the lone rock from a revenue cutter, and all stores and men after that had to be transported from

the cutter to the rock by an improvised breeches buoy. It took more than a year and a half of working days before the light of its 160,000 candle-power flashed out, showing eighteen miles at sea in fair weather.

The Great Lakes are famous for the furious storms that rage over them when they are ice-bound in winter. Then the pounding of heavy ice floes at the base of exposed lighthouses calls for a new skill in their building to resist the attack of ice and gales. One of the worst spots is known as Spectacle Reef, a name given because its two hidden shoals are shaped like a pair of spectacles. It lies where the Strait of Mackinac leads from Lake Huron to Lake Michigan, and is a frightful place in storms. As it was impossible to work in winter, when ice floes battered at the submerged shoals, it was four years before the Spectacle Reef Light was finished. One spring, when the keepers returned to man the light, they had to cut their way through a frozen mass of ice thirty feet high and seven feet deep that barred the door.



HIGH UP ON THE CALIFORNIA COAST

Canada shares with the United States the lighting of the Great Lakes, with three-fifths of the eleven hundred lights under our control.

THE BLACK AND WHITE STRIPED HATTERAS LIGHT

Still another stirring fight was staged between man and sea before the Race Rock Light, off New London, Connecticut, first sent out its warning on New Year's Day, in 1879. The top of a ledge over which a swift current raced had to be leveled off by divers before a foot of the tower could be raised.

It is a striking fact that the first construction that proved a success in ice-bound waters proved also to be the best type in the semi-tropical waters, where lights guard the Florida coast and the Gulf of Mexico. The screw pile which bores in like an auger proved the solution for the base of coral rock.

Many of our early lighthouses were frame buildings on the mainland. As engineering skill met and won over the obstacles of swift water and sea-bound reefs, the work of protecting shipping by these water-bound sentinels has met with but one failure.

The evil name of Cape Hatteras is such that sailors called this stretch of the coast The Sailor's Graveyard. North of here was the wreck of the U. S. S. *Huron,* in 1877, the first iron ship of our Navy, in which her captain and many officers and men were lost. After this wreck lights were placed along the coast which runs from Cape Henry to Cape Hatteras, a lightship was moored well out from the danger of the Diamond Shoals, and the old name died out. The ocean breaks white with fury over the Diamond Shoals well out from the mainland. Ships that blunder into those hissing breakers find themselves helpless in the swirling currents and the grip of the shifting, sucking sands. The chances of rounding Hatteras on a quiet day are rare, and until the Diamond Shoals Lightship was placed it was a hazardous undertaking.

All ships coming from the south to the United States have to cross the Gulf Stream, which hugs the shore at Hatteras. The three-knot equatorial current, meeting the cold water of the North, breeds mist and nasty weather. On one side of the stream you wear Arctic overshoes and on the other are in bare feet. But Hatteras is a valuable aid to navigation and must be picked up. The lightship throws its friendly light, but Diamond Shoals has mocked all attempts to rear a lighthouse on its treacherous sands.

The highest light on the American coast is at Cape Mendocino, on the Californian coast, which throws its 340,000 candle-power light ten out of every thirty seconds from a height of 422 feet above the sea. Its light can be seen twenty-eight miles at sea in fair weather. On the Pacific Coast the towers are usually low, as they are mounted

on high shores, while on the low Atlantic seaboard high towers are the rule.

Brightest of the lights is that at Navesink Highlands, at the door to New York Bay, with its candle-power of 25,000,000. The rays of its glare have been seen seventy miles at sea. It is one of the few

THE PIGEON POINT LIGHT IS TYPICAL OF THE PACIFIC COAST

electrically lighted beacons, with a powerful electric arc enclosed in a lens that magnifies its light.

Largest of all the lenses used is that at Makapuu Point, the land-fall light for vessels bound from the United States to Hawaii.

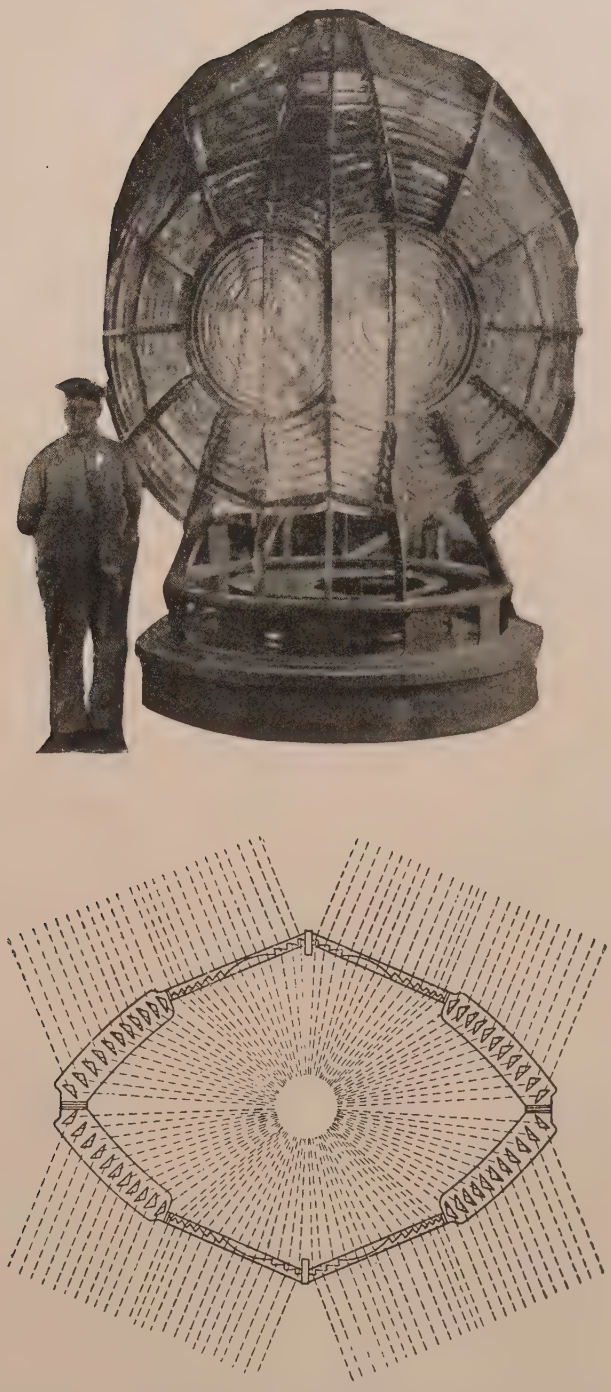
Oddest of all the lights is that at Cape Spartel on the Moroccan Coast at the western entrance to the Mediterranean, for we share with seven European countries the care and expense of this African light which impoverished Morocco built but could not keep.

Where lighthouses are not possible, as on Diamond Shoals, to

mark off shore dangers, and in the approaches to harbors or channels, lightships are used. The first was built by the English to mark the Nore Sands off the mouth of the Thames, as far back as 1732, with lanterns hung from its yard-arm. Our pioneer light vessel rode at anchor at Willoughby Spit, Hampton Roads, in 1820. Now we have a large fleet with its relief vessels to take their places when the regular ships are brought in for docking and repairs.

BRIGHTEST OF LIGHTS IS THE NAVESINK

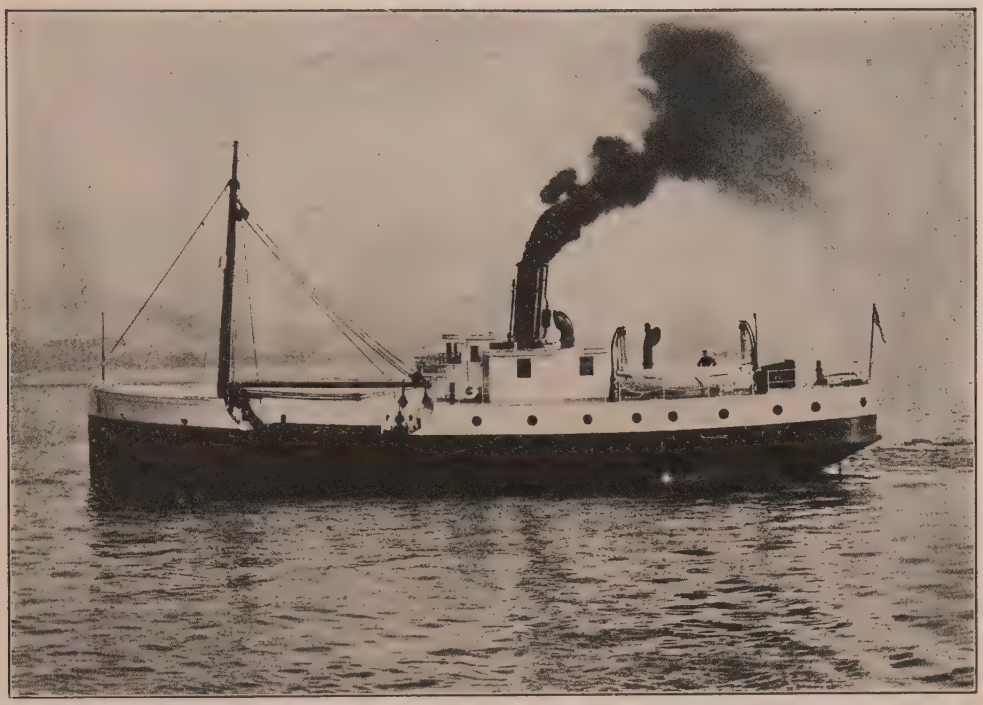
As lighthouses are distinguished in daytime by markings of red and black, or red and white, sometimes in spirals and at others in checkerboards, the light vessels have their hulls painted red or straw color, with other combinations, and their name is painted on the side in large letters. With their odd shape and rig, and usually a cage as a day-mark at the mastheads, they are most welcome sights to inbound ships. They carry both a light at night and a fog-signal, and ships can run close by them without danger,



THE LENS OF THE KILAUEA LIGHT IN HAWAIIAN WATERS

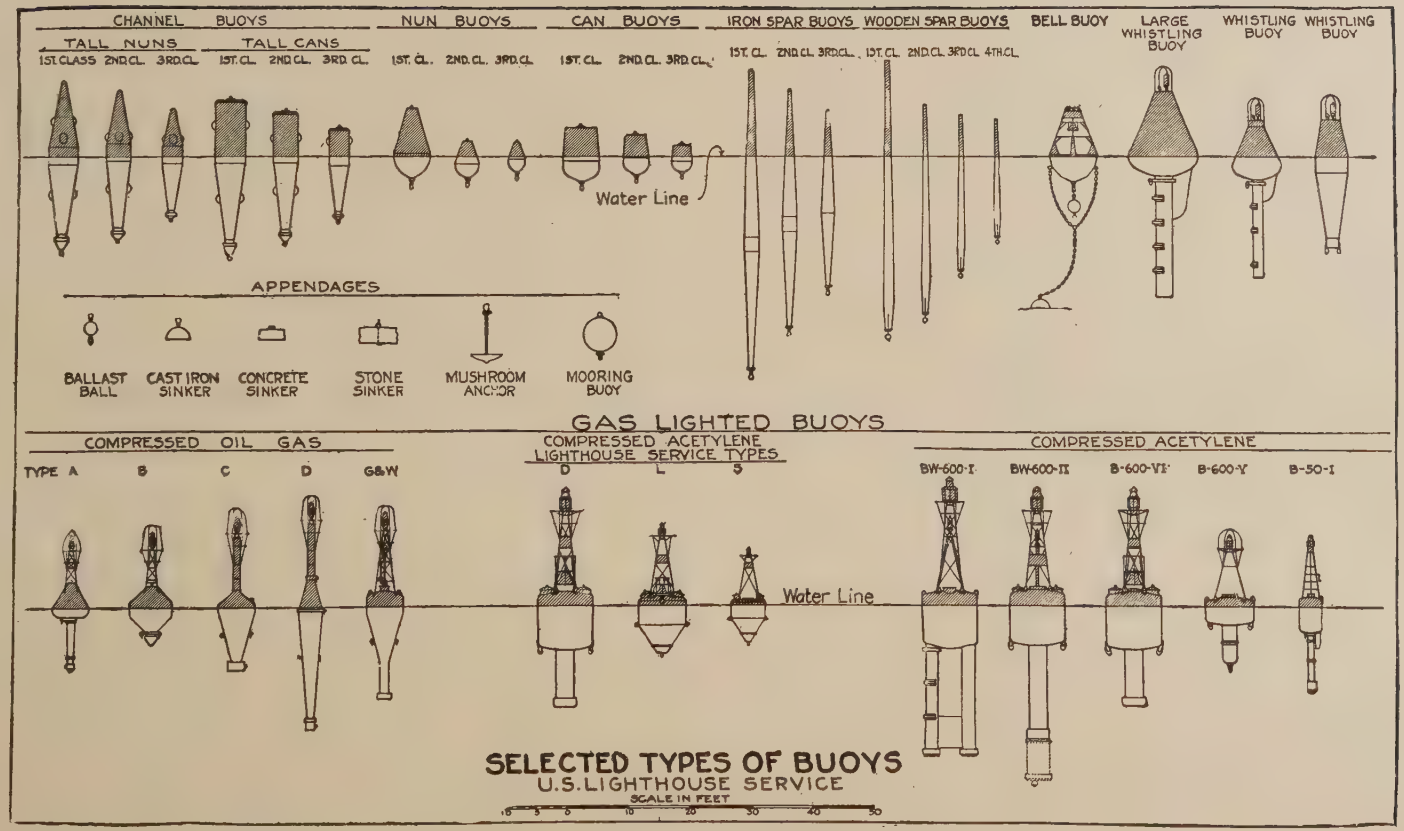
THE NANTUCKET SHOALS LIGHTSHIP ROLLS IN THE STEAMSHIP LANES FORTY MILES OUT FROM SHORE

THE DIAMOND SHOALS LIGHTSHIP



THE LIGHTSHIP TENDER "FERN"

THE SENTINEL OF THE GOLDEN GATE



Courtesy of Bureau of Lighthouses

THE BUOYS THAT MARK AND LIGHT OUR WATERWAYS

fixing their positions in a fog with much more certainty than in the case of lighthouses equipped with a fog signal.

There is something very appealing in the sighting of a lightship well out from the coast, for it is not hard to picture the monotony, the drab routine, the discomforts in rough weather, and the isolated lives that the crew leads. Every effort is made to give them shore leave, to provide them with libraries, fresh provisions and mail; but at times they are absolutely cut off from the world when wintry gales rage and toss them about like shells. Those stationed in the channels that lead to great steamship piers can even see the lights of the great city, yet they are cut off from it as much in such times as though they were in the middle of a desert.

Four of our lightships are equipped with wireless, which the Navy works as a part of its coast radio system. One of them, the Nantucket Shoals Lightship, is more than forty miles from shore and is the first to be sighted by travelers, for it stands pluckily out in the steamship lanes. Her crew is a large one, with four officers and ten men, while less exposed ones carry but a crew of three. Inside the hollow steel mast, which houses a ladder, is a regular lighthouse lens, and on the largest a 12-inch steam whistle is used for a fog-signal. A submarine bell is operated under water, giving the lightship's number when fogs shroud the sea.

While the lightships are known by the name of their station, the tenders which supply them are named after a plant or flower common to the district: *Lilac, Fern, Snowdrop, Ivy,* or *Water-lily.*

How does a captain make sure of the lights that are flashed at night when he approaches the coast? If he is making for the light off Hatteras his chart shows this legend: "Cape Hatteras. Fl. W. 6 sec. Flash 1.4 sec. Eclipse 4.6 sec." Sighting the light, he takes out his watch and times flash and eclipse and in that way knows his light and its characteristics.

The first lights were fixed, but now the more important have lights that either flash or occult. This is regulated by a clockwork mechanism that governs the light and the dark periods. The fixed lights vary at intervals with one or more flashes, usually of greater brilliance; while a flash begins or follows with a lessening of the light or total eclipse, the flash being an interval shorter than the eclipse. When a light is occulting its steady light is suddenly and totally eclipsed at regular intervals shorter than or equal to the duration of the light.

While the white light is more powerful in a fog red lights are

used to mark outlying dangers near the light or the limits of a channel. The light shows white when a passing vessel is clear of the dangers but, through a screen of colored glass, shows red as the shoal or other danger is approached. Then the prudent skipper changes his course until the white light shows.

There is nothing he dreads more than threading his way through a fog, for even the fog-signals play odd tricks at times, the sounds seeming to come from one direction when they are actually sent from another. There is also what might be called the phenomena of "air pockets," when signals cannot be heard by ships close by, although those more distant hear them distinctly. The Lighthouse Service has its minor aids to rob the fogs of their dangers. If you have ever heard the mournful fog-horn and the unceasing strokes of a bell or the weird whistle of buoys you can never forget the uncanny feelings they stir. Seguin, Maine, is the place for any one who enjoys those ghostly warnings, for there the waters are hung with blankets and vapors of gray fog one-third of the year. Out on the Pacific Coast sounding-boards are erected at some points, so that a steamer's whistle brings a quick echo.

The bronze bells of the bell buoys are struck by iron clappers moved by the motion of the waves. The falling of the whistling buoys in the seaway forces air through the whistle on its superstructure. Horn signals are worked by hand and the fog-gun by acetylene. Whistling buoys are moored in the rough outside waters, while the others are used in inside waters.

In daytime our channels are marked by buoys, which are given odd shapes, marked by numbers, and colored in various ways. Some are red and black, while others have white and black stripes running up and down. On their tops are cages, balls, or other marks, all with meanings for the pilot. At night lighted gas buoys mark the most prominent shoals and channels and they are the most valuable of all the minor aids to navigation that make Safety First the coastwise motto of Uncle Sam.

Radio beacons and radio compass stations are the latest developments that have added to safety at sea. In foggy or stormy weather, or when for many hours the clouds obscure the sun, it is not possible to determine a ship position with the sextant. Then a ship is in danger of missing entrance to its port of destination, or of crashing on shoals or reefs. When close to shore the radio beacons serve as its guide. These are special radio stations along the coast, with low-power radio, which send out their characteristic signals at needed intervals in

foggy or stormy weather. Their exact position is known to the ship in need of information. Through locating the radio beacon by recognition of the beacon's characteristic signal the captain, with his own directional apparatus, can determine the direction of the beacon and the line on which he is approaching the coast.

The radio compass stations operate under high-power radio that can be caught by coasting vessels or by ships far out at sea whose position is not satisfactorily known to the captain. In this event the ship in trouble requests a bearing through its radio from two or more radio compass stations. The stations then send out a series of radio sounds while they listen in with their delicate apparatus. When the stations have located the ship by this method, and get its bearings, they report back, and the ship has definite and accurate knowledge of its own position.

A YANKEE CRUISER PASSING GOLD HILL

XX

FOLLOWING OUR SHIPS THROUGH THE PANAMA CANAL

TO send a ship from ocean to ocean through the Panama Canal is as easy for a shipowner as to write the check for the sum that will cover the expense of the vessel's passing through. When the Government receives the check it will attend to every detail and mail him back the change if there is any. From the Atlantic entrance at Colon, to the Balboa exit on the Pacific side, is but a trip of ten hours. One-third of that time is spent in the locks that lift the ship from coast to coast, and the wizard of electricity governs every moment of the time spent in them.

Back of this startling simplicity lies an amazing story. Ever since the wonderful voyages of discovery that began with that of America by Columbus, admirals and rulers, merchants and adventurers, dreamed and schemed of the day when the argosies of the world should find an all-water way that would lead ever westward from Europe to

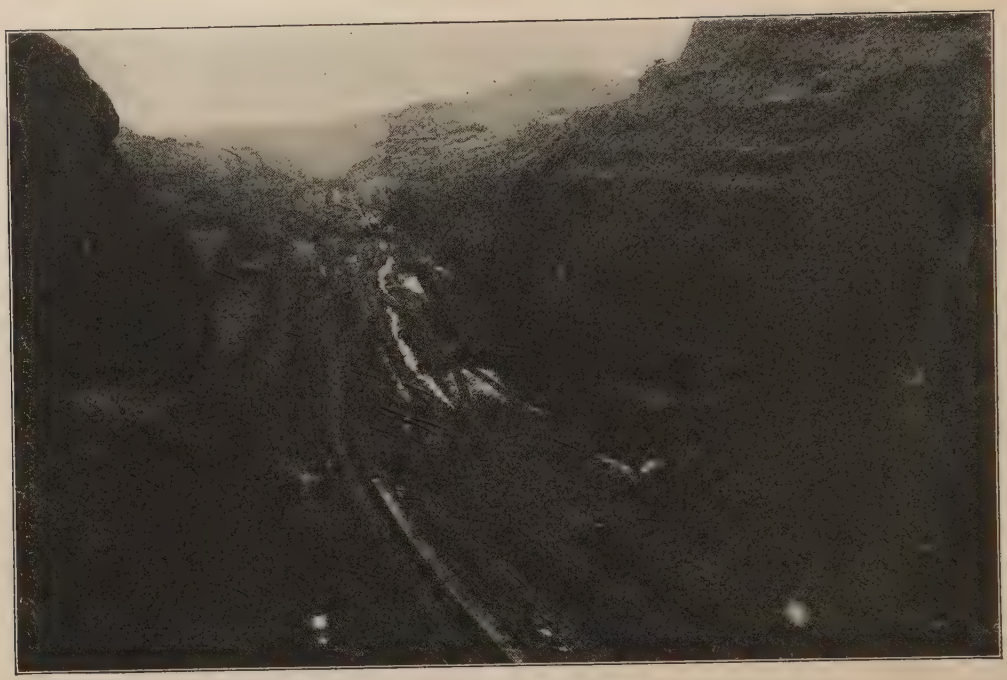
the Far East, across the Atlantic and the broad Pacific. Thousands of men, of high and low degree, of the white, black, and yellow races, laid down their lives before those dreams came true. Fortunes were staked and lost. Spain, England, Portugal, and France in turn took up the dream and its burdens and failed.

Balboa, one of Spain's hardiest soldiers of fortune, was the first white man to cross the Isthmus, stalked by fever and fought by the Indians. It took him twenty-three days. Four hundred years then passed before the silver threads of the canal waters were strung from coast to coast. In the meantime Morgan and his buccaneers had laid the Isthmus waste, revolutions had marked its stormy history, and the gold-hunters of '49 had crossed it in droves to avoid the long trip across the western plains with its danger of hostile Indians.

When Americans first came under the spell that had lured the countries of the Old World to this great project Congress appointed the Isthmian Canal Commission to make a study of the problem. As a result of its surveys of Central America all possible routes for a canal were set aside for the rival claims of the Panama and Nicaragua routes. Since 1883 a French Company, under the famous De Lesseps, who drove the Suez Canal between the Mediterranean and the Red Sea, had spent millions trying to build the Panama Canal. One year before the successful revolution of the State of Panama against the United States of Colombia, in the winter of 1903, the American Commission had decided for the Panama route. The French had stopped all work and it was on May 4, 1904, that our Government took charge of a strip of land ten miles wide running across the Isthmus and called it the Canal Zone.

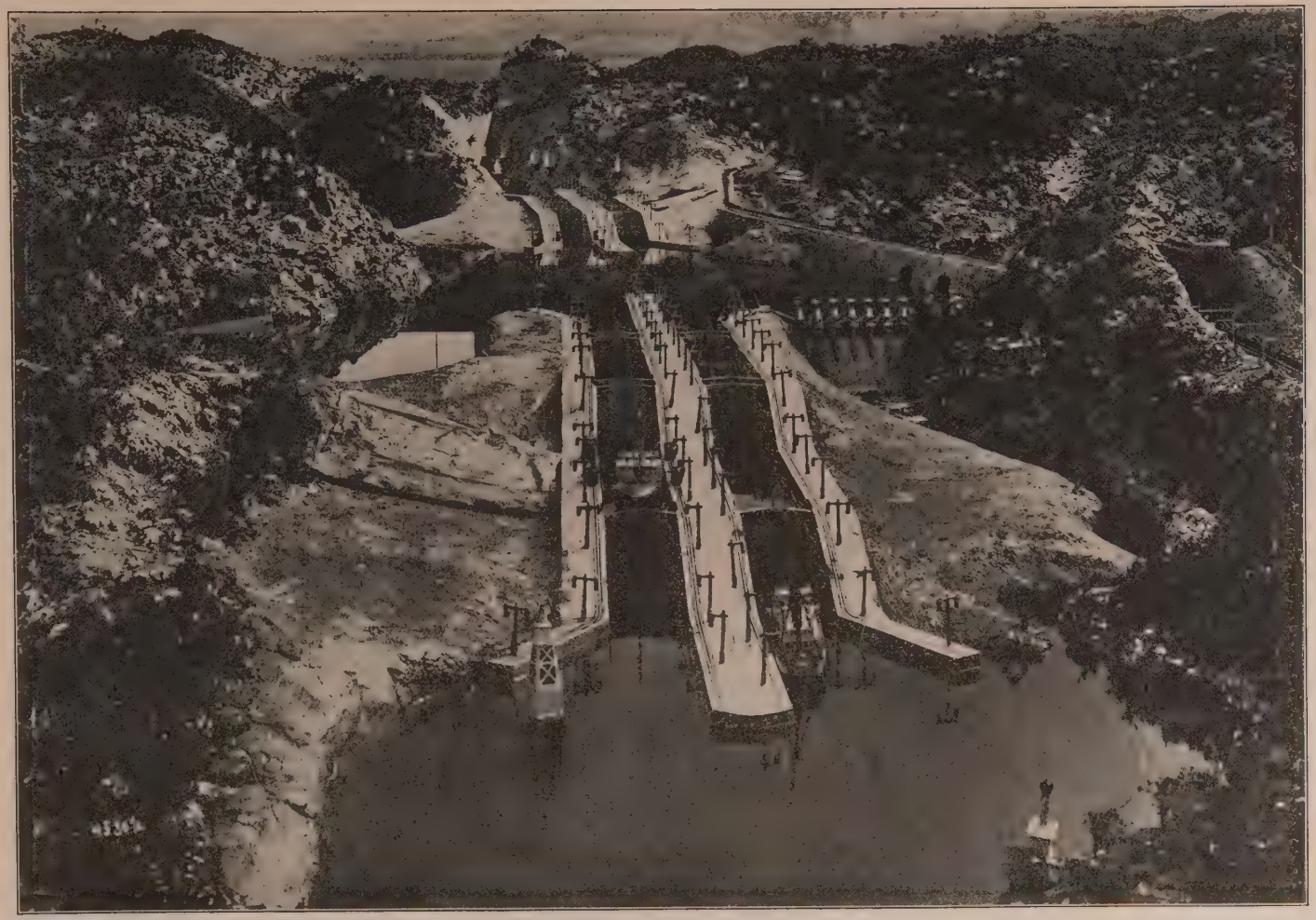
Then came a long fight between those who favored a sea-level canal and those who championed a lock canal. The sea-level would be less exposed to danger in time of war and the expense of maintaining it less. The lock canal would cost half as much more, take half the time to build and ships could pass through more quickly. Whether it should be a lock canal like the Soo between Lakes Superior and Huron, or sea-level like the Suez, was finally decided in favor of the locks. In 1906 actual work was begun, and it was only ten years from the time that the Government stepped into the breach before this golden waterway lay open for the commerce of the nations.

Panama, which lies directly south from New York, is a land of contradictions. Colon, the city on the Atlantic Coast, lies twenty miles to the westward of Panama City on the Pacific Coast. When dawn breaks in Panama City you see the sun rise out of the Pacific Ocean!



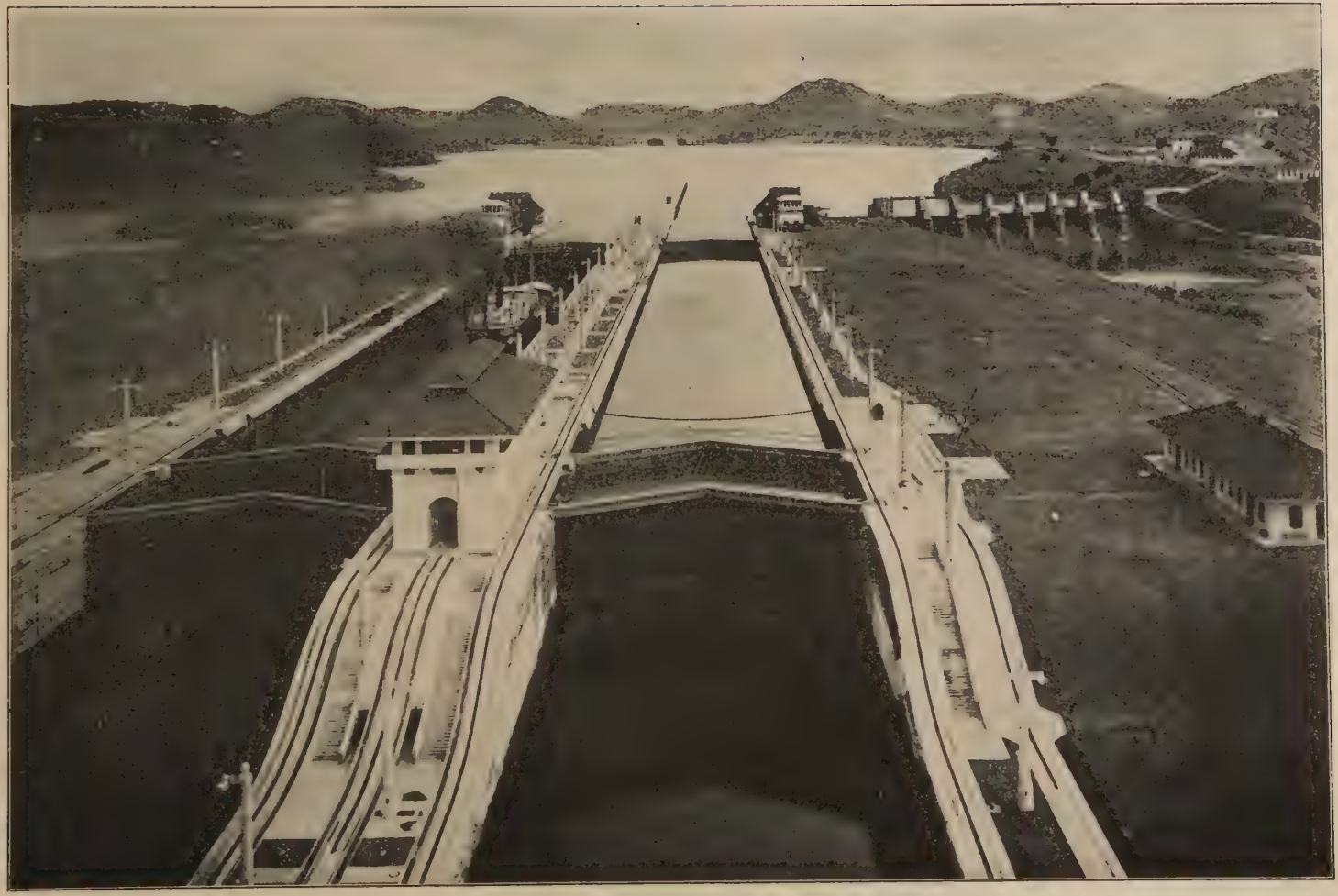
THE DEEPEST CUT IN THE BACKBONE OF THE ANDES

THE GATUN SPILLWAY WITH SEVEN GATES OPEN



Courtesy of "Our Navy"

A MODEL OF THE PANAMA CANAL



MIRAFLORES LOCKS WITH PEDRO MIGUEL IN DISTANCE

When a battleship, an ocean greyhound, or a freighter nears the Canal its wireless splutters its blue sparks while the captain reports her name, nationality, tonnage, length, and draft. If he wishes coal or oil it is ready for him when he enters the channel at Limon Bay. If he wishes provisions of any sort they will be delivered to him at any point he names. From Limon Bay to Gatun the ship runs through a sea-level canal for seven miles; and here an operator, with the touch of a lever, walks it upstairs to the great Gatun Locks. At this new level an electric towing locomotive takes the ship in hand, hauling her at a-mile-an-hour speed. There are three levels at Gatun, and they lift a ship 85 feet in all before she steams into Gatun Lake, the largest artificial lake in the world.

Each lock is built with two parallel chambers so that vessels moving in opposite directions, north or southbound, can use the same flight of locks at the same time. They are all of the uniform length of 1,000 feet and 110 feet wide, and the water in the locks varies from 80 feet, while a vessel is being lowered or "locked" down, to 45 feet while she is being lifted or "locked" up. Massive steel gates block the channels of the lock, cutting off the flow of water; and steel and concrete divide the lock into its chambers. Concrete and steel are the bone and sinew of the locks.

A ship passing through enters a lock as it would a dry dock, the gates acting as the caisson of the dry dock. As water is pumped into the lock the ship rises with it. In this simple manner it is raised to a higher level and when the gates are swung open passes on into the new level. In "locking" down the opposite method is followed.

A pilot is in charge of each ship and controls the movements of the towing locomotives by signals of his arm. At the ends of each approach wall of the locks fifteen-foot steel arrows signal to him when the lock is ready for him. Ships in their journey through the locks are for all the world handled like a railway train on its "run." There are the signals, the sidings, the stops and telephone and telegraph communication from one end of the canal to the other, besides the towering radios.

A mammoth dam holds the waters of the Chagres River in leash to make the Gatun Lake, and this yellow river—once second only to Culebra Cut as the greatest engineering obstacle on the Isthmus—now harnesses its floods to make the Canal a success.

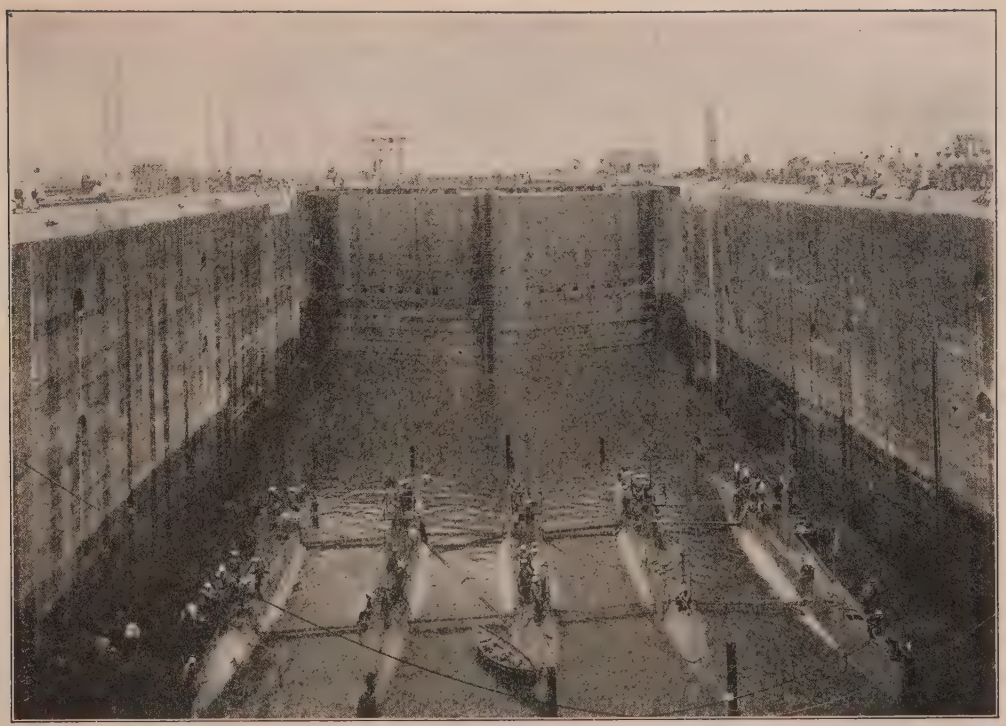
Through the Gatun Lake the ship steams at fifteen knots, reveling in this chance to show her heels, for at all other points no speed higher than six knots is allowed. The shores wind along low banks

heavy with jungle growth and flecked with strange water plants. Sixteen miles from the dam she slows down to twelve knots, for the 1,000-foot channel here narrows to 800, and four miles on, as it approaches the famous Culebra Cut, speed is reduced to ten knots. The banks are clean-cut now and the water that curls up under the ship's forefoot spreads away in widening ripples.

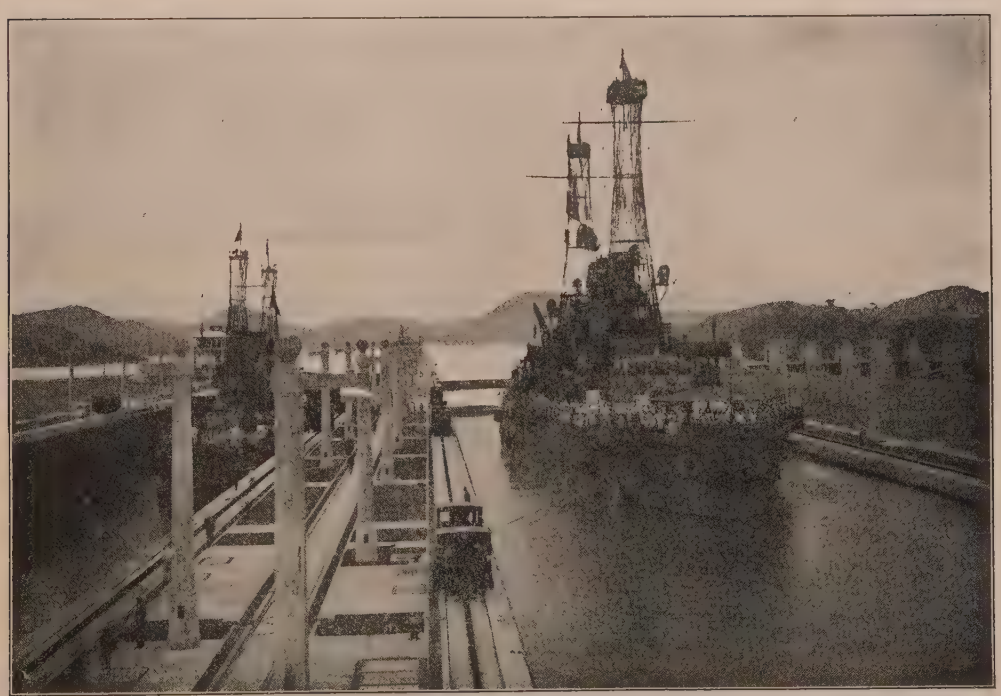
Culebra is the Spanish name for snake. This crooked cut that the French had begun on the highest point of the canal route, had a reputation sinister as that of the coral snake, the venomous serpent of the Isthmus, until American engineers triumphed over its heart-breaking difficulties. Here was the backbone that held two continents together, and outraged nature gave way to her anger at the intrusion of giant dredges by great slides that filled up the work of months. The waters have buried all traces of that great fight that changed the name of Culebra Cut to Gaillard Cut, in honor of the Colonel of Engineers who finally cut the backbone of the Andes. The eight miles of this giant cut show high banks that are still scarred and gashed with terraces where noisy dirt trains once ran. Here and there a graceful palm-tree shows against the skyline and the swamps and jungles of the Chagres country have been left behind for shores that fall rapidly away to the blue Pacific.

No longer is the ship lifted from level to level, for the lock at Pedro Miguel drops her thirty feet and then the pair at Miraflores lower her fifty-five feet more. In the background the low, rough peaks of the Andes are hazy in the tropical sun and the waters of Miraflores Lake gleam like burnished copper. All along the route the effect of this miracle in the wilderness deepens, with the banks lined with bungalows and storehouses, with playgrounds and parks, and at night arc-lights show where but a few years before only the faint loom of candles in a native's shack lighted the night. At Balboa, the Pacific terminal, where the boom of the Pacific's long surges can be heard, lies a concrete dry dock that will float the largest ship in the world. Here are great wharves, stores of coal and oil, and modern warehouses where the jungle lay.

This is the story of how American science and skill and Yankee determination drove the great ditch across swamp lands and through rugged mountains, winning out over the obstacles that the jungle, the hills, the rivers, and the deadly climate had thrown in the path of other nations. President Grant first declared for this "American canal under American control." It was Roosevelt who began the



AMERICAN SUBMARINES LANDED ON CRADLES IN GATUN LOCKS



BATTLESHIPS IN UPPER CHAMBERS OF MIRAFLORES LOCKS

THE U. S. S. "MISSOURI" WAS FIRST BATTLESHIP TO PASS THE CUCARACHA SLIDE

work, Taft who saw it grow to completion, and President Wilson who threw it open to the world. The French had wrought nobly to crown their long labors with success, and when we took up the unfinished task we profited greatly by their experience and their work.

The opening of the Canal was a boon to the American Navy. The long run of the U.S.S. *Oregon* around the Horn to help out the Fleet in '98 opened our eyes to the need of this great waterway. By it the distance to be logged from a central point on one coast to a central point on the other has been cut from 13,000 miles to 5,000. Before it was opened the Atlantic Fleet and the Pacific Squadron were severed by the Isthmus as effectively as though they were on opposite sides of the world. Now only the slim gap of forty-odd miles lies between their oceans. Our battle fleet can steam from New York to Seattle, lie there ten days at anchor and ten more at San Francisco, and pass under the Brooklyn Bridge within three months from the start.

THE FLOATING CRANE "HERCULES" IN GATUN LOCKS

The problem of coaling on a cruise from coast to coast, such as the Fleet wrestled with when it circled the globe, is now a simple one. The fuel that lies at stations over which our flag flies along the whole route can carry our battleships from the Atlantic to almost any place in the Pacific where they may be needed. This alone is a tremendous

advantage, for to fuel ships beyond our shores in time of war would be a staggering problem.

The Panama Canal has wiped out distances with a prodigal hand. Not only the Navy but our growing merchant marine, whether coastwise or deepsea, has benefited. Water transportation from coast to coast is much cheaper than rail, and the time saved from the old sailing route is vital to shippers. It has brought New York and San Francisco closer by 7,873 nautical miles, and the sailing vessels that rounded the Horn between those great ports have cut down the average time of a return trip from 250 days to 120 days. From Colon to Balboa by way of the Horn is 10,500 nautical miles while the trip by canal is less than 44 miles.

The majority of ships that use the Panama Canal are engaged in our coastwise trade and their average saving in time on each voyage from coast to coast is over a month at sea. The Canal has brought San Francisco 5,666 miles nearer to Liverpool, and the port of New York now lies 3,717 miles closer to Valparaiso on the west coast of Chile by virtue of the ditch through the jungle lands of Central America. Yokohama, one of the favorite ports of call for all sailormen in the Far East, had New York brought 3,768 miles nearer than by the Suez route. These are but a few of the striking changes which the Panama Canal has made in the trade routes that are strung like a great spider's web across the seas.

Courtesy of "Fleet Review"

GETTING THE RANGE

XXI

THE FLEET AT BATTLE PRACTICE

WHEN the American Fleet steams out to sea for its battle practice every man on board, from the youngest apprentice seaman to the Admiral himself, wears his heart on his sleeve, and his eyes are bright, for to him it is the greatest game in the world. Back of it lies a wealth of tradition that no other game can rival. No other can approach it in science, in the millions invested, or in its thrills. The boundaries of its playing field lap over a circular rim of ocean that stretches to every point of the compass, and extends beyond the horizon, with the Admiral's four-starred blue flag in the center.

It is played with the gray steel tubes of the most powerful guns, which serve up thousand-pound projectiles that leap from them at a speed of half a mile a second, and throw up cascades of white water at the target ten miles away. The target is a screen of timber, covered with netting and strips of cloth, and is no larger than the advertisements painted on the fences of a big league baseball grounds. The call to "Play ball!" is a fiendish battle gong, and when the

Courtesy of "Fleet Review"

THE TARGETS OF THE GUNS

FITTING ON THE BULL'S EYE

Copyright by O. W. Waterman

THE NAVY'S SKY GUN

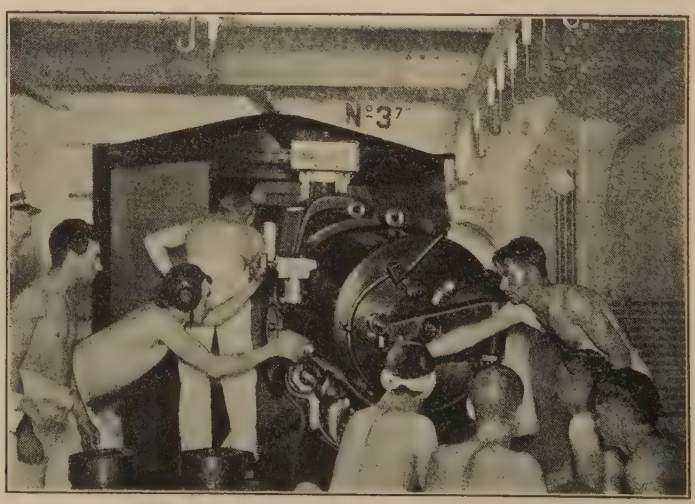
THE GUNS USED IN SUB-CALIBER PRACTICE

Admiral calls, "Time!" the blare of bugles carries his edict to the teams.

It is played only at the end of patient months of practice, and it is packed, from start to finish, with incidents that equal the last minute of a football game in which an eleven forges across the goal for the winning tally.

Its reward is the privilege of painting a three-foot white E, the mark of Excellent, on the winning turrets, and, for the champion of the Fleet, a strong lead for the battle efficiency pennant, a red pennant with a black ball in its center, to be flown at masthead for a year. The Navy calls it the "meat ball," for it is like the meal pennant that flies at the yard-arm of every ship in commission three times a day. Back of these meager rewards, however, lies the grim satisfaction that the next great American naval battle will be won by proficiency in the game.

When the Fleet steams out from Guantánamo Bay to its favorite playground, the rails, stanchions, and ladders are unshipped and the life lines removed. The decks are bare. Fragile ar-



A SEVEN-INCH GUN CREW

ticles are stowed away, and pictures and electric light bulbs laid on bunks to save them from the shattering effects of concussion from the fire of the guns. Boats are swung inboard and "nested," the smaller ones in the larger; and if you walk about the decks you will see vegetable lockers, boats, crates, and all manner of wooden gear tagged "overboard"—and over they would go in battle, so that an enemy shell would not tear them into flying splinters.

The quick tattoo of battle gongs clang noisily, insistently, when the teams line up for the final practice, calling them to "general quarters." From the wardroom the "spotters" come storming up the ladders. Glasses to watch the splash of the shells are strapped over their shoulders, and chin-straps hold on their visored caps. Some are in dungarees. The members of the gun crews drive past you at the double quick to their stations: bluejackets inside the turrets, bandsmen to the sick bay, the pay clerk to his assigned post, bluejackets and marines to the ammunition passages and their hoists. There is not a man aboard who has not his post; and down in the hull of the ship are the men of the engine room force ready to give her every ounce of needed power.

Courtesy of "National Review"

COMING ON THE RANGE

Every man who passes has a patch of fleecy cotton peeping out of his ears, and as you dig in your pocket for some a bluejacket halts long enough to caution you to pack it in lightly and not to hold your hands over your ears.

The turn of your ship to fire at its target has not yet come, but off to port or starboard you see a vivid sheet of flame leap out from the turret gun of another ship that is on the range. A cloud of smoke hugs the water alongside her and a great roar grows with each second. It is like the thunder of railroad engines racing at full speed over a bridge. You see her shell strike the sea and throw up a geyser of

Courtesy of "Fleet Review"

A PERFECT STRADDLE SHOT

white water. On beyond it other and smaller geysers rear their white columns when the shell ricochets, skimming across the sea in bounds as a stone thrown by a lad skims across a mill-pond.

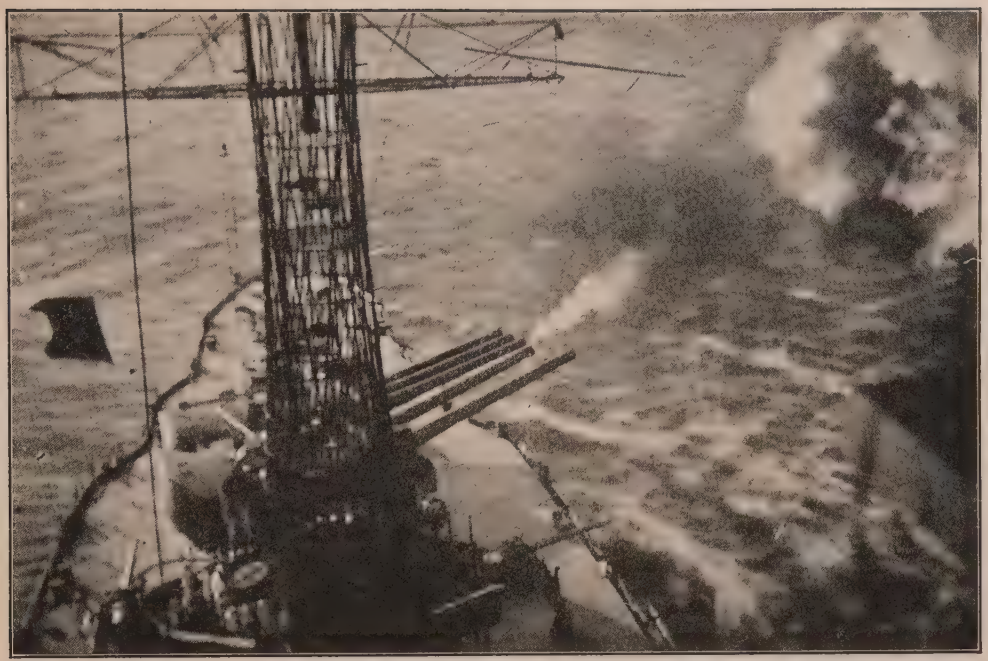
A still more thunderous roar comes across the water when a salvo, or broadside, is let loose, and each shell, as it strikes, sends up its whirling column of water.

So far you are but an idle participant in the great game, watching it at a safe distance. Your ship is at last on the range, and the order to fire has been flashed to one of the turret guns. A mighty blast rocks the mass of steel beneath your feet and it slides to port from the drive of it. The military masts, for all the world like inverted waste-baskets, appear to whip over to one side like a bent fishpole, and you grin and try to affect the calm of a true sailorman. If you have been alert you have caught fleeting impressions of vivid white sheets of flame, great blurs of orange-colored vapors, and you grasp the nearest support and strain your eyes toward the target.

The "spotters," with eyes glued to their glasses, watch for it too, and pass below their judgment of the range. If the range is good the first salvo will tear the water near

Courtesy of "The Marines' Magazine"

A BIT OF SHELL-TORN SEA



THE FORWARD TURRET GUNS FIRING

Copyright, E. Muller, Jr., N. Y.

FIVE-INCH GUN DRILL SHOWING DETAILS OF POINTING AND LOADING

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A DREADNOUGHT'S BROADSIDE SALVO

the target into boiling geysers. A hit will pass through the screen of netting and cloth and will add its bit to the fight for the gunnery honors. Now and then when a two-gun turret launches its shells simultaneously, and the range is perfect, a "straddle" shot is the result, one just over and the other just short of the bobbing target. Field artillerymen call it a "bracket," and it is rarely that two shells fired at exactly the same range will not show this dispersion.

Other ships are firing, loosing their twelve-, fourteen-, or sixteen-inch shells at their targets. It is a deepsea spectacle that would have driven Nero or Barnum into hiding for pure shame. Wherever you look toward the targets you see flying jets of water churning green sea to white. The air is filled with lightning-like flashes and rolling clouds of vari-colored smoke. The dull boom of big guns plays through it all.

If you were privileged to enter one of the big turrets you would carry away with you a jumbled impression of its activities. A gun crew stripped to the waist, with the light of battle in their eyes. An interior white as a hospital ward and just as clean. A gun-pointer with his eye placed against the rubber eye-piece of his telescopic sight with the cross wires centered on the target. In recent practices our ships have fired at ranges and broken world's records that a few years ago were hardly dreamed of.

The turrets are far from the noisiest part of the ship, for the walls of armor deaden the deafening roar that greets you on deck. It is quiet in the interior of a big turret, with its whirring, smashing, clanking fury, its snakelike hiss of compressed air that blows unburned particles of powder and powder bag lining out through the muzzle before the breech is swung open, but quiet only when compared with the racket on deck. And it would, if you could enter it through the trapdoor at its bottom, fasten the lure of the game on you so that you would never forget it. You would wonder if there could be another spot where so much energy is crammed into the flying seconds.

The fire control station, down below, where the armor belt shelters it from harm, would rival it if you could visit its sacred precincts. Here comes word of the varying fortunes of the game, from turrets and tops, from bridge and engine-room. Out from it goes the changing range and the orders that shake the big fighter from stem to stern, from truck to keel, with the roar and thunder of salvos.

The game takes on an even sterner phase when the umpire, from another ship, plays his part. In actual warfare the ship might meet with distressing casualties besides the loss of men struck by shell

THE LAST SALVO

fragments. A big gun might be put out of action and she would have to fight with the remaining ones. So the umpire plays the part of the enemy's shells and the ship must play the game as he orders it.

When the game is at its height tons of steel are rushing toward the luckless target at the rate of half a mile a second, and their sudden and almost simultaneous departure creates an immense vacuum. From the depths of the lower decks and the engine-rooms below them the air rushes out to fill that vacuum. The sharp blast assaults your ears and tears your cap off your head if you are not vigilant. And when "Cease firing!" shrills out on the bugles you welcome their music. It is strangely quiet now, but the ship still bustles with life.

Bluejackets and marines are shipping ladders and stanchions, rigging out boats and sweeping down. Uppermost in their thoughts is the picture of a shell-torn target; and news of hits, rumors of a winning salvo, stories of a turret's guns obscured by flying spray at an unlucky moment, are told and retold. The decks are thick with cinders and dotted with white sticks that look like toothpicks. They are the unburnt shreds of smokeless pow-

Courtesy of "National Review"

WHEN CEASE FIRING SOUNDS

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NIGHT FIRING WITH TORPEDO DEFENSE GUNS

der that the guns have sprayed from their muzzles. The "black gang," as the crew calls the engine-room force, come up on deck in little squads, hungry for news and a draught of fresh air.

Fifteen years ago the greatest game of them all was no more like the game you have watched than the first practice of a college eleven is like the championship match that winds up the football season. Ordnance itself made seven-league strides from the days when the red-turbanned pirate of the Spanish Main squinted an eye along the barrel of his Long Tom at a gold-laden galleon, but, except for the advance in gun, sights, and projectiles, the gunners who swept two Spanish squadrons off the seas in 1898 had made but little progress. Both had relied on their native skill in firing at the moment when the downward roll of the ship would bring the gun to bear on the target.

To-day the American gun pointer, the best in the world's navies, lays the crossed wires of his sight on the heart of the target as soon as it can be seen, and holds it there indifferent to the pitch or roll of a heavy sea. Minute after minute, as the range narrows by thousands of yards, he holds his sight until the bugles end the game. The drills are known as the "ping pong" and sub-caliber drills.

Sub-caliber work develops the team work that is necessary for record scores in the big game to follow. A small caliber gun, such as a one-pounder, is mounted on a turret gun so that its bore parallels that of the big one. A target reduced to scale is anchored several hundred yards off the ship and its exact range is measured. Then, in every detail that the turret practice is carried out as it would be in battle, except that the shot is fired from the little fellow, the sub-caliber practice is held. The men who survive this last test make the turret their home for the rest of the cruise and work like a railroad president to cut down the loading time and the firing interval by the fraction of a second.

They are the kings of the Fleet and their less fortunate mates treat them as royalty should be. They are the men who can make the heaviest score for the "meat ball" and they are "the men behind the gun" that we read about when American ships meet an invading fleet on the high seas and drive it back in shattered units to its shores.

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THE TRIPLE TURRET GUNS OF THE "PENNSYLVANIA"

XXII

BIG GUNS AND LITTLE ONES

THE fight for victory between gun and armor has gone merrily on, like that between the attack and defense of a football eleven, ever since the sloping sides of the first ironclad stopped the round shot that had until then gone crashing through stout walls of oak. Both have had one common ally in the great strides that have been made in the manufacture of steel. But other allies came to the help of the gunmaker, and to-day the gun has outstripped the armor. To-morrow the armor-maker may stumble on a new process of making steel and defy the smashing bite of the most powerful shell.

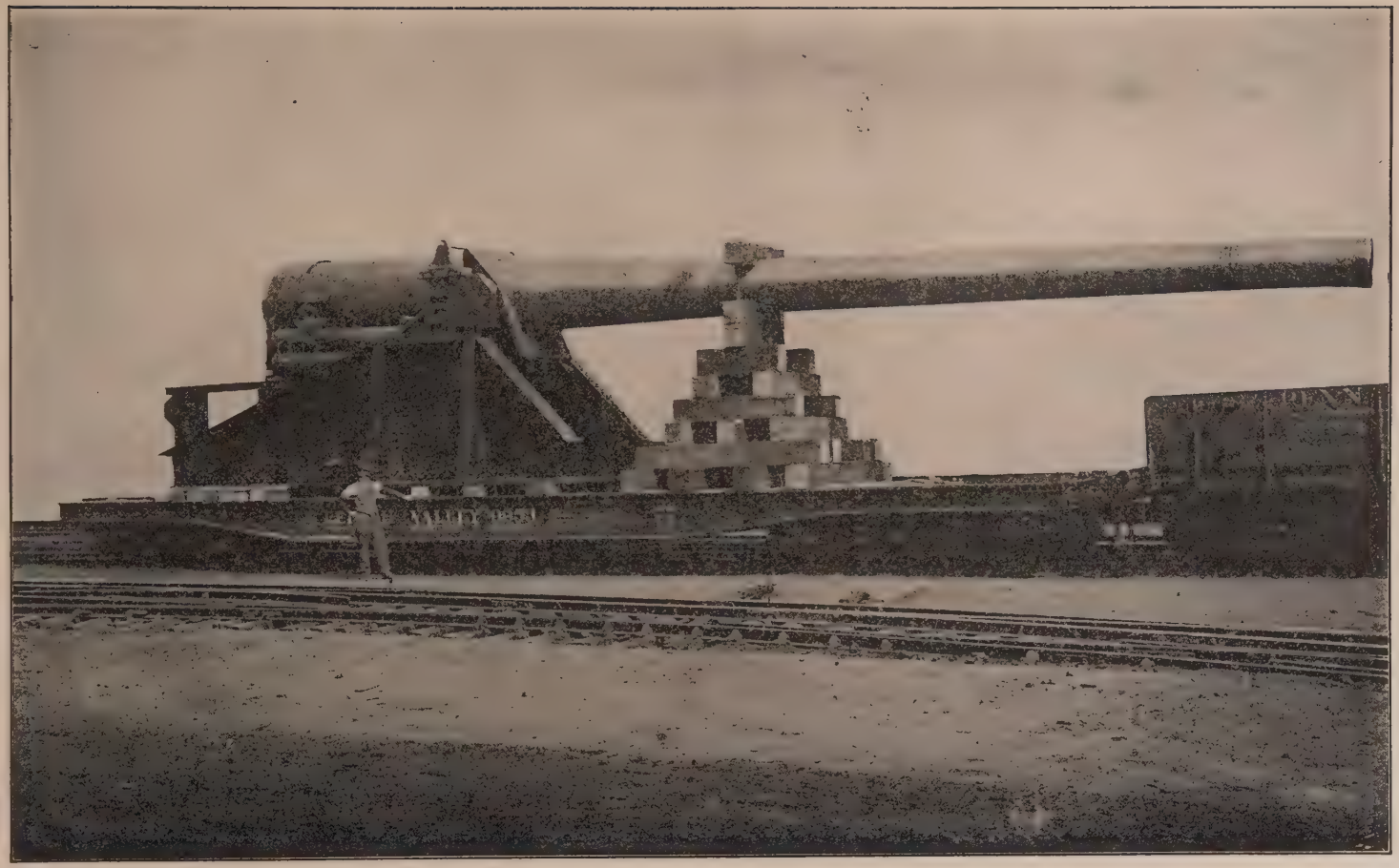
The armor-maker, when his wrought-iron plates proved of no avail against the pointed shells that came with rifled guns, was put to it to find some way of hardening his armor. It was not until 1889 that the Harvey process of introducing nickel into steel made this

possible. The Krupp process made still another advance; and now all armor on a modern sea fighter is face-hardened, super-carbonized steel except the tops of the turrets and conning towers.

MARINES AT ANTI-AIRCRAFT DRILL

While armor made these strides the gun made greater ones. The improvement in steel brought guns that could fire more destructive shells, loaded with explosives that would have shattered the old barrels, to ranges hitherto undreamed of. When the increase in the size of ships made it possible to give her more armor protection it also made it possible to carry more guns, and heavier ones. The chemist came to the aid of the gun in this thrilling race, by inventing powerful explosives that more than matched the new steel plates. The sight-maker turned out telescopic sights that allowed the gunners to find their target as far away as the limits of the sea's horizon. Other inventive geniuses made the firing of the big monsters safer, more rapid, and more deadly.

The modern gunmaker looks upon his gun as a high-speed and great-heat-power engine of war. The average life of a big naval gun



A 14-INCH NAVAL GUN LEAVES BETHLEHEM FOR INDIAN HEAD PROVING GROUNDS

is close to 300 rounds; so you can see what tremendous shocks, what terrific wear and tear, the big gun suffers. You can see also that any flaw means its ruin, and death and injury to its crew.

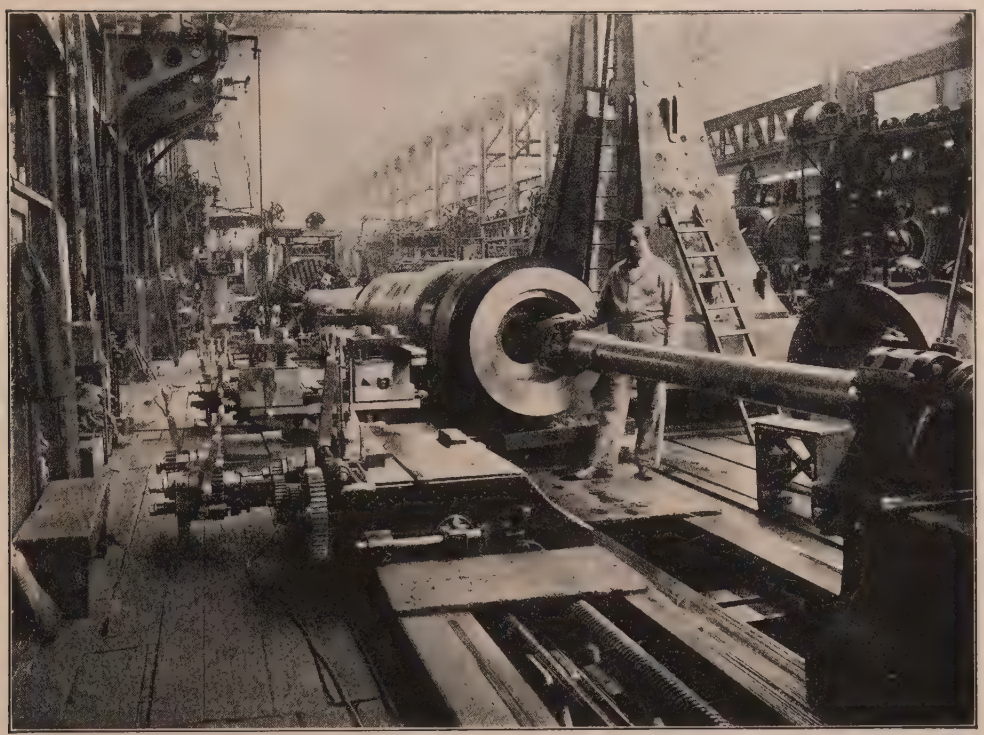
No gun of a single piece has ever been built to stand up against the punishment that the modern big naval gun must stand. The big gun is really made up of separate parts united in an interesting manner known as the built-up system. These parts are the tube, jacket, and hoops, and all are made of the best plain or nickel steel, which has been forged, while at white heat, by giant hammers into their first resemblance to a gun. The tube, the barrel of the gun, is made in one piece. Inside it is placed a very thin lining of steel. When the finished gun has fired round after round, and its "life" is worn out, the gun is relined and is as good as new. The jacket fits over the rear end of the tube and in its rear end is the screw-box, which is to be part of the breech mechanism. Over the jacket and tube come the hoops, all of different sizes, tapering down toward the muzzle, which fit over each other. That is the built-up gun.

These separate parts are first turned out as rough forgings, tempered and annealed to give them their sturdy qualities, and they are then taken to the machine shop to have their outer surfaces trimmed into shape. The solid steel of each is then bored out by powerful machinery. Powerful as it is, the gunmaker has no trouble in shaving it down to the thousandth part of an inch. The parts are now ready to be assembled, or fitted together, and here comes the most startling part of all the work on the built-up gun.

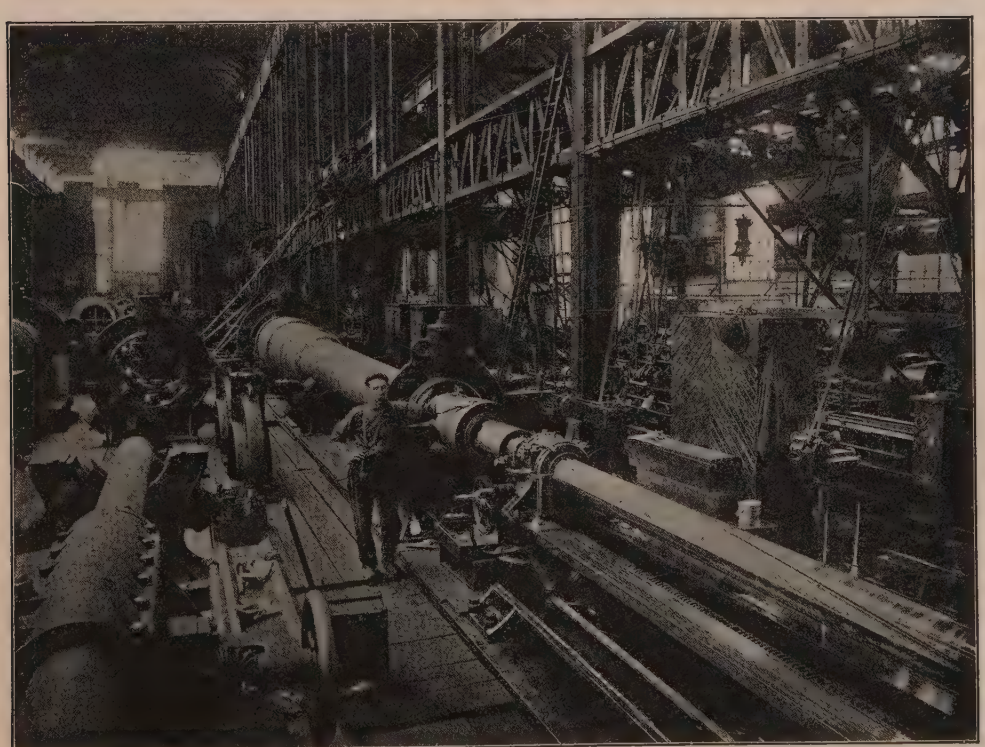
It is built-up from the inside, beginning with the mammoth piece of steel that we know as the tube. This is placed on end, muzzle up, in the shrinking pit. Inside its hollow length flow water and oil. The jacket, the next largest piece, is then heated in a hot-air furnace to a temperature of between 600 and 700 degrees, and this tremendous heat has expanded it so that, when it is lowered down over the cold tube by a giant crane, it rests easily, and not too snugly, over the rear end of the tube. The jacket, cooling in its bath of water and oil, gradually shrinks and tightens with powerful grip until it seems like a part of the tube itself. Before the hoops are heated and shrunk on in the same way, the tube and its surrounding jacket are hoisted out of the shrinking pit and the outside shaped to receive the hoops.

We now have our built-up gun except for the finish-boring of the inside and the finish-turning of the outside, and other small changes.

In the rear of the gun the powder chamber is bored out to hold the powder bags, and to give the gases formed by their ignition space



BORING THE POWDER CHAMBER OF A BIG GUN



RIFLING A LARGE NAVAL GUN AT THE BETHLEHEM STEEL COMPANY'S WORKS

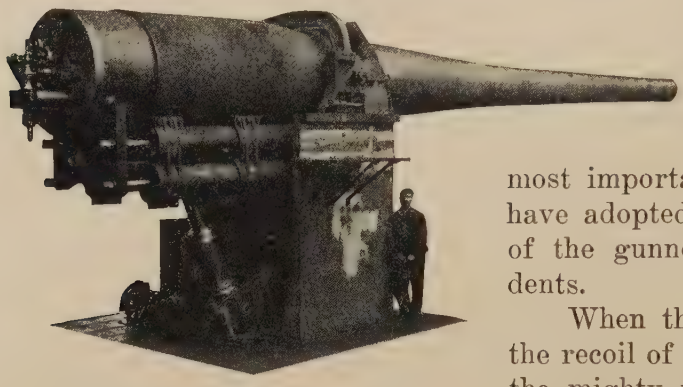
IN ACTION WITH GAS MASKS

in which to do their work of driving out at blinding speed the great projectile. Then the gun is ready for its rifling of the bore. The rifling is a series of spirals, or twisted grooves, cut from the forward end of the powder chamber to the tip of the muzzle. These grooves give the shell a spin or twist that makes it fly steady along its axis to the target. Without them the shell would wobble and fall far short of its mark, and be at the mercy of a strong wind. Near the base of each shell is a rotating band of copper. When the gun is fired this soft metal is driven into the grooves and in their grip the shell makes two complete turns in the barrel before it reaches the muzzle.

READY TO HOIST A 16-INCH SHELL ABOARD

Before the gun is ready for its tur-

ret the breech mechanism must be finished. There are several kinds of breech blocks or plugs in use in our Navy, but the one most used is called the interrupted screw system. Its block is threaded much like the ordinary screw with two or more sections of the threaded block cut out. These cut-out sections are known as blanks. The screw-box, in the rear of the tube, has an equal number of threads and blanks. A turn of the breech block lever forces the threads of the block into the blanks of the screw-box and then the block rotates so that threads and blanks lock together. The gun cannot be fired until they have locked and the electrical connections for the firing are completed, and this double device is one of the most important that gunmakers have adopted to make the work of the gunners free from accidents.



A TURRET GUN AND ITS MOUNT

When the gun is fired, and the recoil of the explosion drives the mighty weapon back a full three feet, the recoil is checked by the hydraulic recoil cylinders and the gun is brought back to its original position by the heavy spiral springs that the recoil has forced back into tight coils. This recoil mechanism is connected to the gun by a heavy yoke which is placed over the breech end of the gun.

If the gun is not meant for one of the turrets, but is a five- or seven-inch gun in the broadside battery, it must be fitted with a shield. This shield is secured to the gun's carriage, and the gun sticks out through a porthole in the center of the shield.

In the latest ships the heavy guns, ranging from twelve to sixteen inches in caliber, are placed two or three in a turret. The broadside guns are from five to seven inches in caliber, with the smaller size coming more into use, as they have been found to be the guns that are to be relied upon to drive off or sink the torpedo destroyers in their favorite night attacks. The other guns of the secondary battery range down from the six-pounders to the three-pounders. These are either automatic or semi-automatic, and are mounted on the rails, in the fighting tops, and carried in the motor sailers and other boats for their protection and to cover the landing of bluejackets and marines.

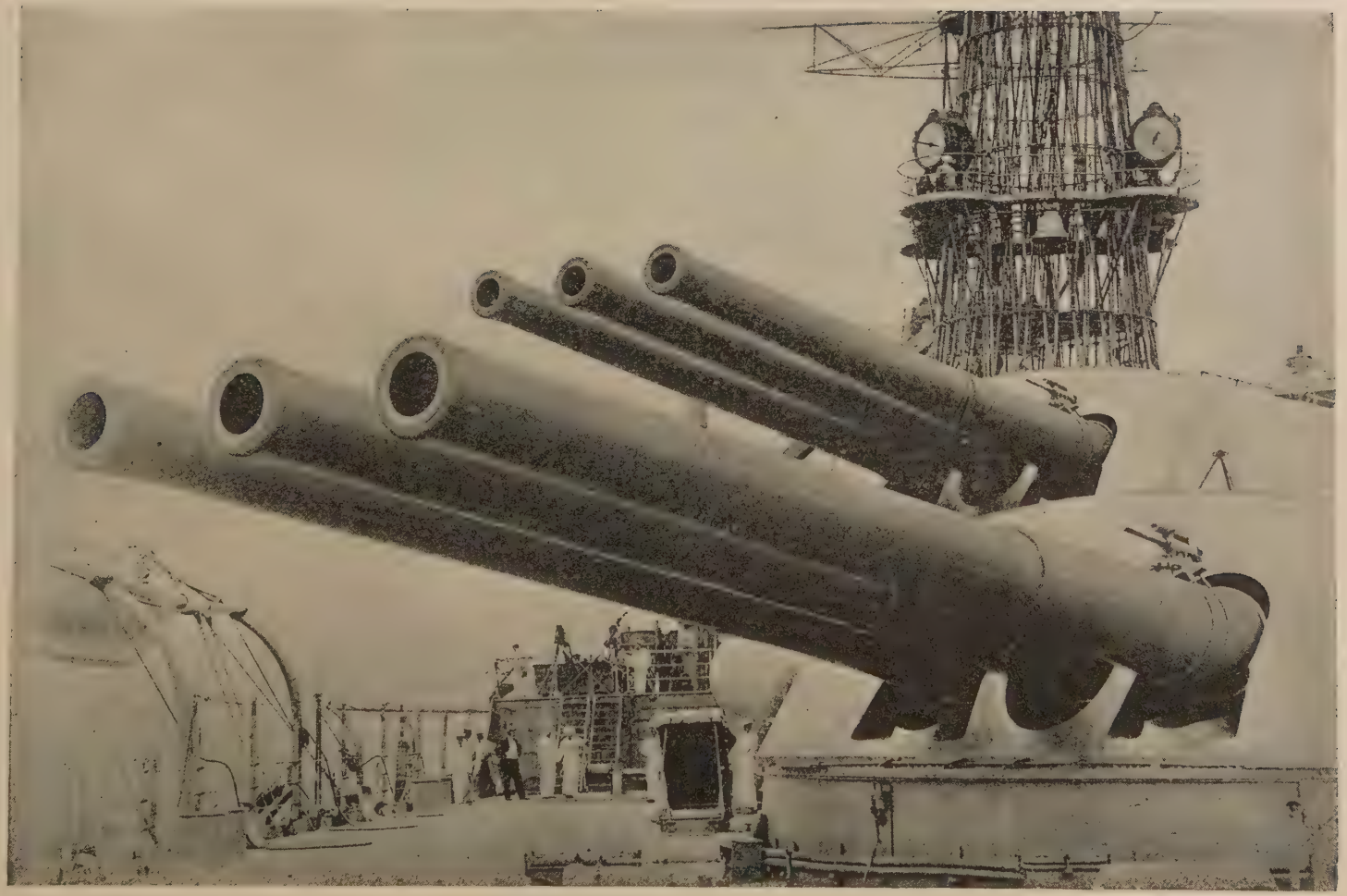
The word caliber, which indicates the size of guns, is used in the

Navy to describe not only the size of the bore, but the length of the gun. For instance the shell fired from a 16-inch gun measures just sixteen inches across its base. If a gun is referred to as a 16-inch 45-caliber gun it is 45 times as long as the diameter of its bore, or 720 inches. This gun, which is the largest on any of our superdreadnoughts in actual commission, is fed with a shell that weighs 2,100 pounds; is driven from the muzzle by a charge of 570 pounds

SUB-CALIBER PRACTICE

of smokeless powder at a rate of half a mile per second; and the gun itself weighs 105 tons. This shell, fired at the heaviest armor afloat at the distance of 19,000 yards, will penetrate it. Fired at a shorter range, when it is tested out at the Indian Head Proving Grounds on the shores of the Potomac River, it passes through this plate at the almost unbelievable speed of less than a thousandth part of a second.

When the *West Virginia* fires its battery of eight 16-inch guns it lets loose 16,800 pounds of metal at the one blow. When the *West Virginia* is on the range and delivers that broadside from



THE MONSTER TRIPLE TURRET 16-INCH GUNS

her turrets more than seven tons of deadly steel will tear through the air in a mighty mass.

Besides all these guns, ranging from the 16-inch to the semi-automatic one-pounder, we now have a new gun, the anti-aircraft gun, which the Navy calls her sky gun. These are for protection against Zeppelins and aeroplanes, and are so mounted that they can be fired straight up into the air. They fire a three-inch shell at the aircraft, and are semi-automatic in action.

All our Navy guns, whether made at the Washington Navy Yard or by such private firms as the Bethlehem Steel Company, are tested out at the U. S. Naval Proving Grounds at Indian Head, Maryland. This lies twenty-five miles below Washington, on the left bank of the Potomac, and with its extent of one thousand acres there is also a clear water range of six and one-half miles.

Besides testing the shells against heavy armor plate, backed up by timbers and sand, the velocity of the shell is found by a clever device. Two screens of electrically connected wires are placed in front of the muzzle. As the shell tears first through one, and then the other, the time of passage from one screen to the other is registered by a delicate instrument.

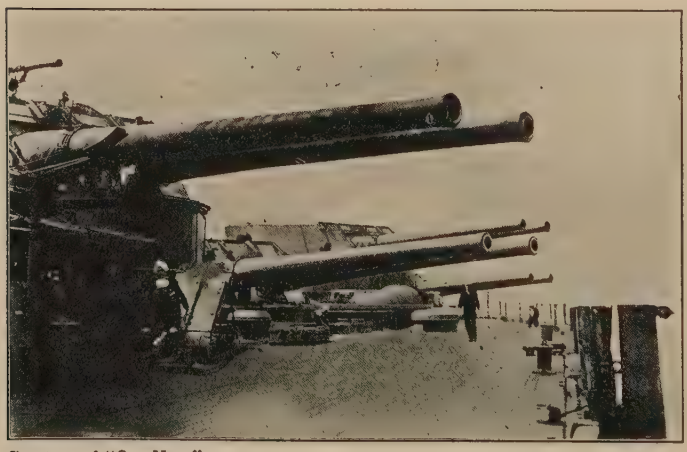
The powder used in these tests and in battle is smokeless powder. The old black powder is used only for salutes and for the bursting charges of the shells. Smokeless powder ranges in color from light lemon to dark brown, and is perforated, for all the world like macaroni. It is perfectly safe to light it in the open air, but when it is ignited in a closed place, like the interior of a gun, it develops powerful gases that drive out the shell at a rate as great as 3,000 feet the first second of the flight.

The Navy has a handy way of marking its shells so that one can tell at a glance what they are used for. The armor-piercing shell is painted black, with a yellow nose to show that it is loaded with high explosive. The common shell, which is not used against heavy-armored ships, but against objects on shore, is painted lead-color. The shrapnel, used against bodies of troops or trenches, is painted white; and the blind shell, which is used in target practice, and which has sand in place of the bursting charge, is painted red.

The weight of modern naval shells ranges from 33 pounds for the 4-inch to 2,100 pounds for the 16-inch. The blunt nose or cap shown in the photograph grouped with the old cannon balls, or round shell, is for the purpose of increasing the penetration of the projectile when it strikes armor by protecting the sharp point of the shell which it

OLD ROUND SHOT AND OLD FORM OF STEEL-CAPPED SHELLS

ARMOR PIERCING SHELLS WITH MODERN LONG POINTED SOFT CAPS GIVING GREATER RANGE AND PENETRATION



Courtesy of "Our Navy"

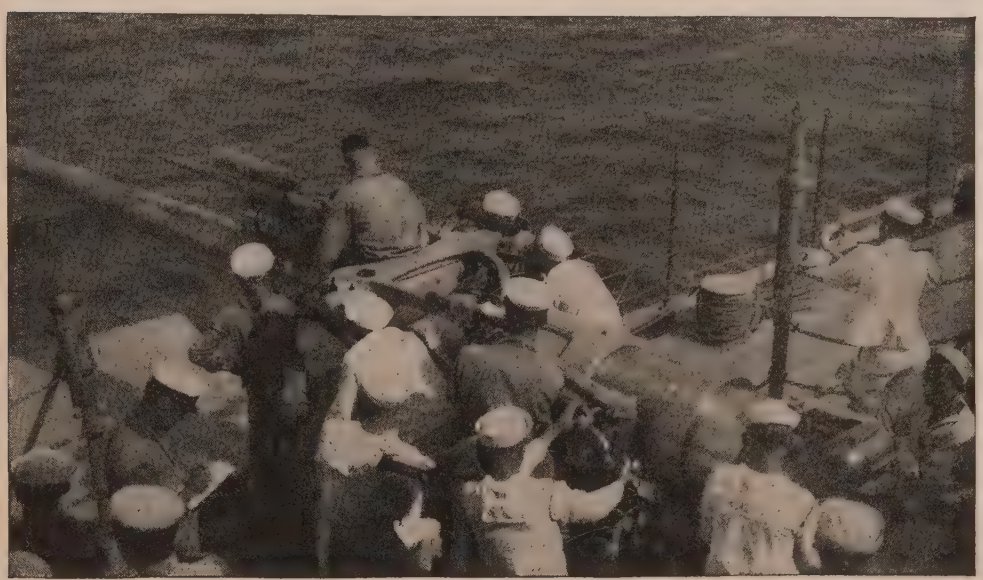
THE BEST ARGUMENTS FOR PEACE

covers. In passing through armor this nose is stripped off but it has then done its work.

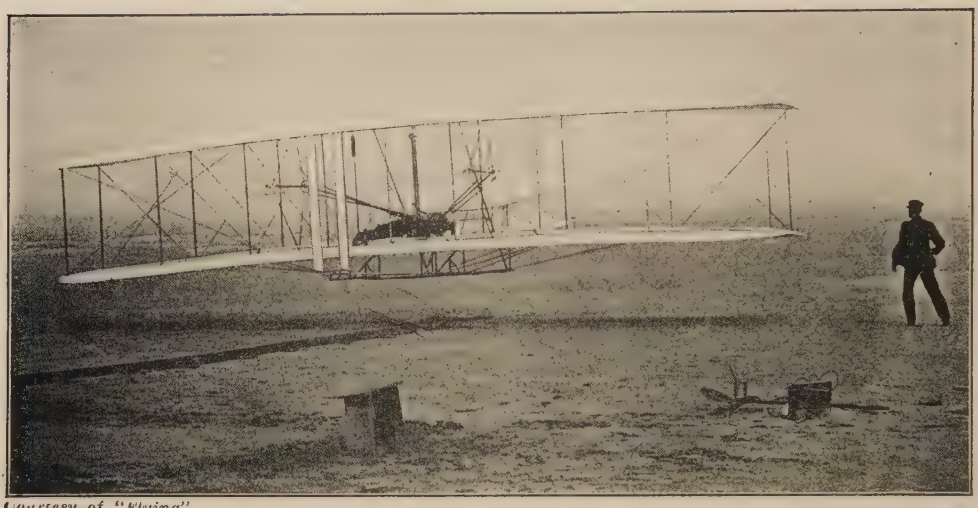
Of the three shells, or projectiles, used by our Navy, the armor piercing and common shell are of forged and tempered steel. Their chief difference is in the size of the inside cavity which holds the bursting charge of explosive. The armor piercers hold from 2 to 3 per cent. of high explosive, which bursts the shell into fragments after it has passed through armor and into the hull of a ship. The fragments which are first burst by the resistance of the armor are broken into still smaller pieces by the bursting charge, and the flying bits of steel kill men and wreck guns, as they have a very high velocity.

At Indian Head shells are sometimes fired with the cavity loaded with sand.

The latest type of armor-piercing shells from 5- to 16-inch caliber have a long pointed cap that gives them more accurate flight and much greater range than was possible when the blunt cap was used. As the photograph of these latest shells shows, they are much like a modern rifle cartridge in shape.



A 5-INCH GUN CREW



Courtesy of "Flying"

THE FIRST HUMAN FLIGHT. ORVILLE WRIGHT, DEC. 17, 1903

XXIII

FIGHTING SHIPS THAT FLY

THE remarkable strides in aviation have had a marked effect on the navies of the world. Before the World War there was little to indicate that dirigibles and planes would give us a new fighting arm. That great conflict saw huge squadrons of aircraft on all fronts in the military operations. At sea they did not exercise any great influence, yet it was made clear that the future would see tremendous advances in their efficiency. Today no navy is a well-rounded one that lacks its proper quota of aircraft. The modern navy must operate on the surface, beneath it and in the air.

Fourteen years before the World War awakened Americans to the rôle that aircraft were to play in warfare Wilbur and Orville Wright began their experiments. Their first flight over the barren sand dunes of Kitty Hawk, North Carolina, lasted but twelve seconds, but it was an historic one. For the first time in history a man-carrying, power-driven plane took to the air, flying at a speed of 30 to 35 miles. It was another American, Glenn H. Curtiss, who made the first successful flight in a seaplane. That was in 1911 and five years later Congress appropriated $3,500,000 for naval aircraft.

The general term of seaplanes covers all flying craft that operate both on the water and above it, and we now have five distinct types in the fighting, scouting, patrol, observation, and the bombing or torpedo planes. In addition to this fleet of seaplanes we have the airships and the aircraft carriers, and their importance is such that a separate chapter must be devoted to their story.

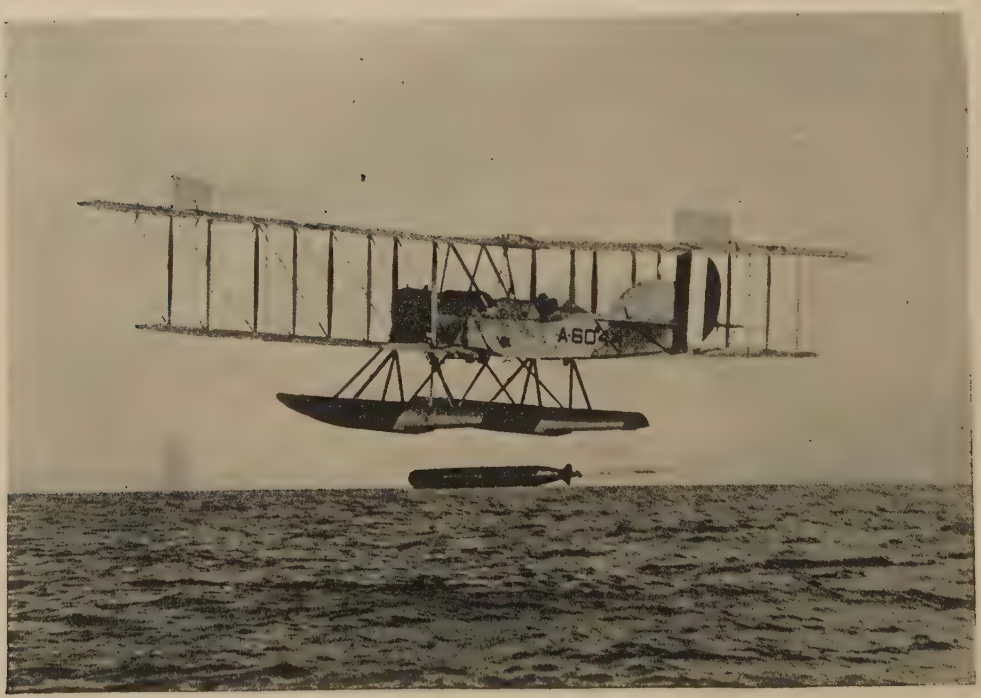
The seaplane crews are trained primarily to operate for and with the Fleet. Their field is the sea, while the army birdman operates over and beyond the lines held by the army on land. Naval tactics are necessarily different, although the fundamental principles of warfare are true on both land and sea. This is so because the battlefield is radically different, and the sea-miles that a fighting fleet may cover in one distinct sea-action may be even greater than the land-miles over which an army may fight in an entire campaign. There is a marked difference in the construction and operation of the seaplane and the airplane, and the naval service must have its distinct and separate air force.

The proper use of the seaplane in battle requires severe training of the personnel. They must not only be expert fliers but must know naval tactics. They must be familiar with naval codes and ciphers, expert radio operators, skilled navigators and trained machine gunners. Only through close and constant association with the Fleet, and through continual drill can they cooperate with the surface and undersea fighters.

A typical flying school of the Navy is at Pensacola, Florida. Here a landlocked bay, separated only by a narrow strip of land from the Gulf of Mexico, gives ideal conditions for training. Straight out to sea the planes wing, without a landmark, buoy or lighthouse to guide them, and their chief reliance is the compass. The base has both concrete and floating hangars to house its fleet of aircraft. Other stations are at Hampton Roads, Lakehurst, and in the vicinity of Washington, with others at San Diego on the Pacific Coast and, on foreign stations, at Panama and Honolulu.

Veritable beehives are these air stations. Scout planes take the air and glide back. Student aviators take their initial flight under the guidance of a veteran flier. Motors and machines are tested in the shops. Experts on aeronautic subjects deliver lectures. The fliers must not only learn how to fly and to act as observers, but they must learn the construction and repair of machines and motors; and experiment with the handling of dirigibles and balloons. To qualify as a naval aviator the student must show his proficiency in stunt

THE AMBULANCE CARRIES PATIENTS IN SPACE IN REAR OF PILOT



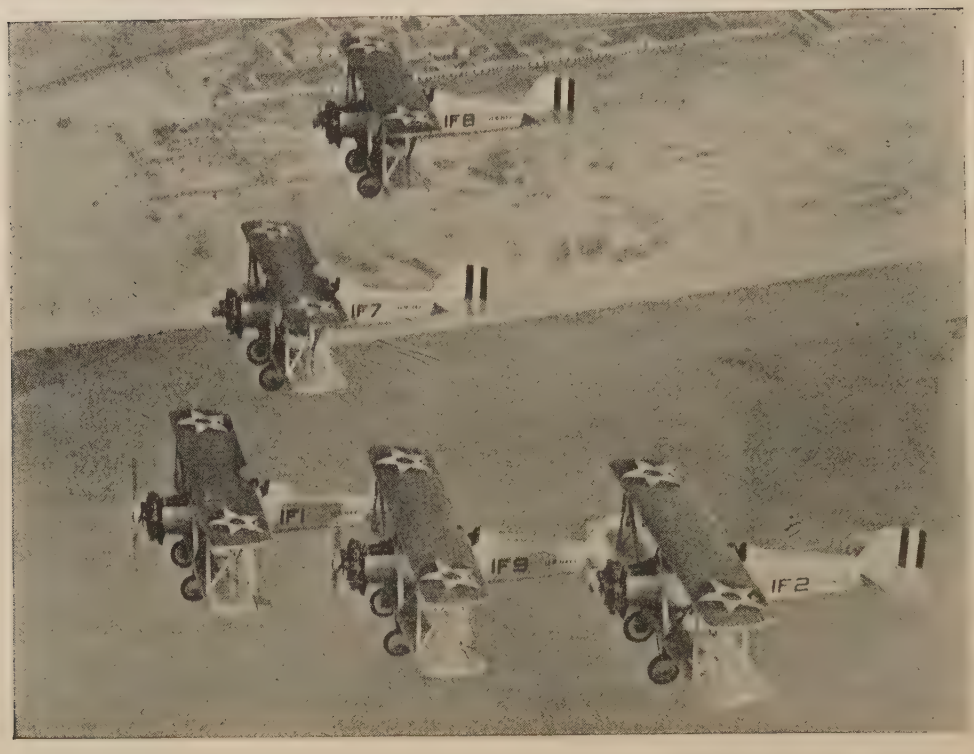
TORPEDO PLANE LAUNCHING ITS MISSILE

flights, quick climbing to high altitudes, fly in rough weather, land at sea and on a carrier, take off from a catapult while a ship is underway, send and receive radio messages while in the air, scout and locate a ship well out at sea by his compass bearings. Then comes the final test to qualify as a naval air pilot by demonstrating his ability in difficult air navigation. In 1925 the midshipmen at the Naval Academy were first placed under instruction as aviators, and even those line officers whose duties do not require flying have found it necessary to study aviation in all its phases, for the next great sea action may depend on the intelligent use of the Fleet's air force.

Extravagant claims have been made by enthusiastic aviators for the part that an air force will play when two great Fleets are locked in deadly combat. Yet these claims that they have already revolutionized naval warfare and made the battleship obsolete must wait for the acid test of war. When that comes the aircraft of the Fleet will have a many-sided part to play.

To them will be assigned the task of bombing the enemy's battle line, with their chief objectives the battleships and aircraft carriers. They will be called on to launch both their aerial bombs and their torpedoes, and to lay a smoke screen to mask a maneuver, to screen an injured fighting ship, or a thick screen to cover a wing of the battle line from enemy gunfire. They must not only attack but they must defend their capital ships from bombing flights launched by the enemy. In the final analysis they must defeat the enemy's air force to aid the Fleet in securing command of the sea. Once this is accomplished the enemy will be unable to drive off a bombing flight with

A SEAPLANE TAKING OFF



FIGHTING PLANES IN FORMATION

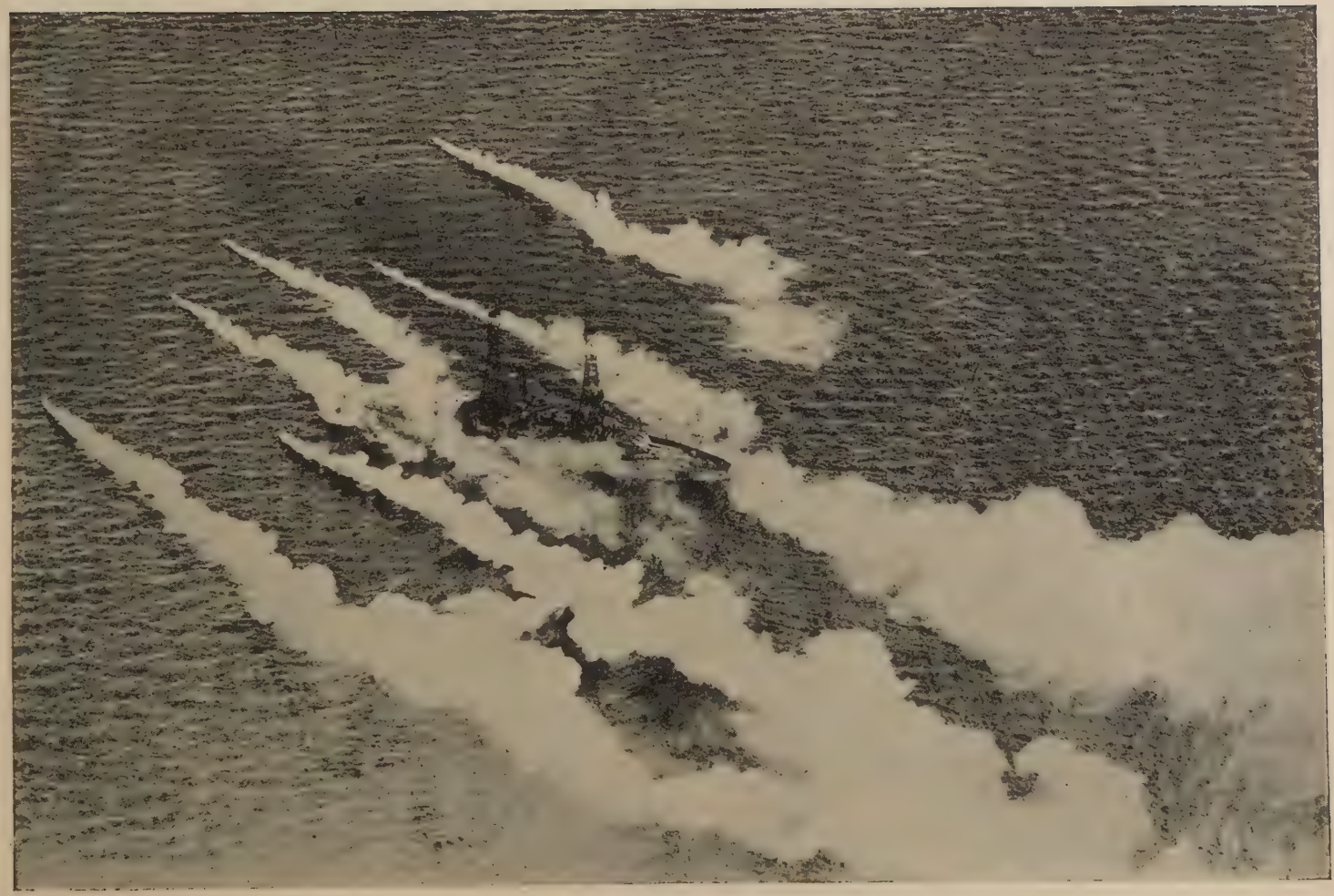
his fighting planes and, with the control of the air secured, the side that has won this advantage can, with its observation planes, direct the fire of the big guns with an accuracy and increased range of fire that will go far towards winning a decisive action.

Let us sum up the planes and weapons of a naval air fleet, and then match against their power the limitations that may seriously affect their value. The fighting plane is carried on battle ships, on aircraft carriers and on certain large ships of the Train. They have high speed, climb swiftly and can be maneuvered quickly. In action they would defend the fighting ships from bombing flights, fight for control of the air and protect their own bombers when the latter launch their attack. Scouting planes are fast craft also and when contact with the enemy fleet seems probable they can cover a large area of search, for in place of bombs they carry extra fuel. Once the enemy is sighted their powerful long-range radio flashes the news back.

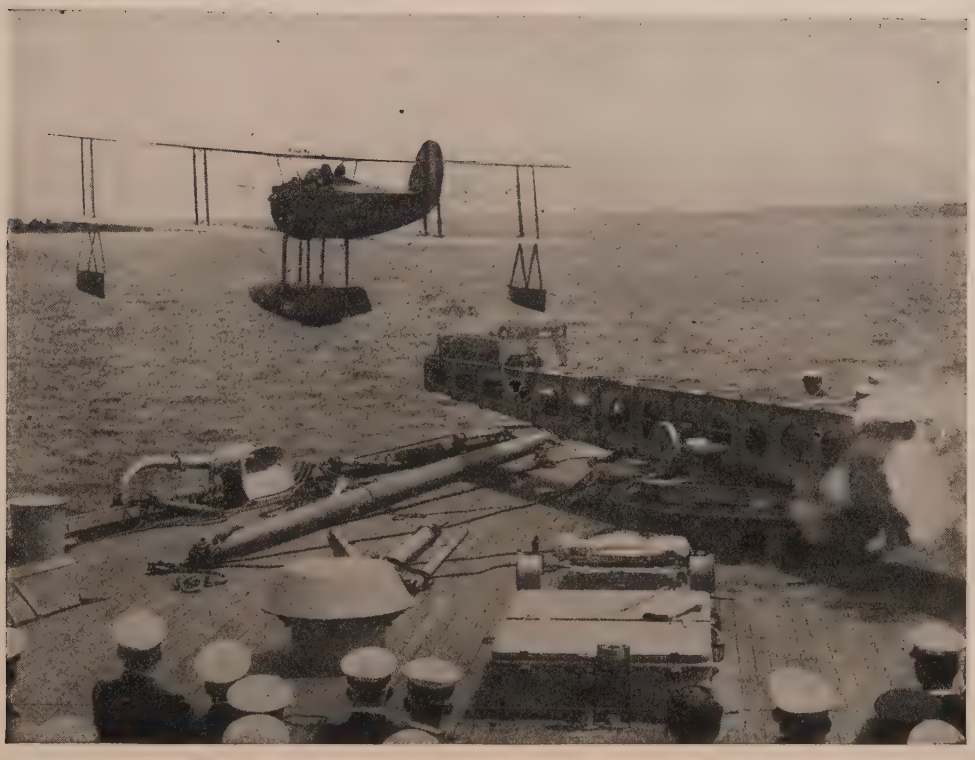
The chief rôle of the observation plane is to observe and control the gunfire of the Fleet at ranges beyond which the spotting of shots

Courtesy of "Flying"

A CURTISS FLYING BOAT RETURNING FROM A FLIGHT



SEAPLANES SCREENING A BATTLESHIP



LAUNCHING SEAPLANE FROM BATTLESHIP'S CATAPULT

from the fighting ship's tops is impossible. By observing the splash of the falling shells the error in range is calculated and the proper correction is radioed back to the ship. Their use has greatly extended the effective range of naval guns and improved its accuracy. When carried on a battleship the observation plane is shot off its deck by a catapult, while those on the aircraft carriers fly off the decks.

Patrol planes are too large to operate from a surface craft, but their great radius allows them to operate far out at sea and then return to their base. They, like the other planes, are armed with machine guns to drive off an attacking plane, and they also carry bombs designed for effective use against submarines and destroyers. They are admirably adapted for coastal patrol or in the vicinity of a fleet base.

Torpedo, or bombing, planes operate from the deck of carriers or from a shore base. Their chief target is the capital ship and the troop and supply ships of an enemy force. Our Navy has developed a torpedo plane that can carry a 2000 pound bomb or torpedo, and, by substituting fuel for this weight it can act as a scouting plane with a

cruising radius of 2000 miles. The value of an attack by the torpedo plane, when its weapon is the torpedo, lies in the great speed with which the attack is made. To deliver this attack, however, the plane must descend to within 25 or 30 feet from the surface of the water, an easy target for gunfire.

In addition to its aerial bombs, its torpedoes and its machine guns planes can use gas bombs, and this serious menace is one that the Navy must meet by devising effective defensive measures.

Such are the powers of aircraft in a naval engagement. They cannot operate in fog, snow, hail or heavy rains, and high winds greatly hamper them. Operating in the dark against a fleet with its masked lights they could locate the ships only at very low altitudes. Once over their target they would illuminate it with flares while the target ship would reply by firing star shells that would show the aircraft to the gunners.

The bombers are particularly handicapped by the limited flying radius due to the heavy bombs that they can carry. Each bomb, it must be remembered, supplants an equal weight of the fuel that is necessary for an effective cruising radius. To increase the bomber in size in order that it might carry additional bombs might appear a simple matter. To do this, however, would require too much weight to make the bomber of sufficiently strong structure to support itself in the air. More power would also be required to drive it through the air, so that the increased size would represent but little gain in bomb-carrying capacity and would cut down its cruising radius.

Again, when a seaplane is forced to land on the sea, either through injury or lack of fuel, it is practically helpless. Aircraft cannot occupy enemy territory and can exercise control of the sea over only a limited area. They cannot operate safely in any territory for any length of time when that territory is not under control of their own fleet or army. An air force can, by itself, win a war only by bombing raids into an enemy country organized on such a large scale as to paralyze that country's industrial life.

In the World War more than 190,000 planes, both sea and air, were used by all the nations at war, but largely on land. They did not seriously influence the decisions on sea.

What is the fighting ship's defense against aircraft? Experiments have shown, notably in the bombing of the battleship *Washington,* that batleships are not invulnerable to air attacks. By increasing the thickness of deck armor against falling bombs, by zigzagging or changing the course when a bombing plane hovers overhead, and

by making structural changes in the interior of a battleship, the air menace can be lessened. Defending aircraft may be able to drive off the attack, while a barrage of 5-inch shells from the anti-aircraft batteries, thickened by the fire of machine guns, will either disable attacking aircraft or tend to keep them at such an altitude that the accuracy of their aim will be interfered with.

The battleship *West Virginia,* for instance, with her eight 5-inch guns can fire explosive shell to a height of 28,500 feet, or five and one-half miles, with a rapidity of fire equal to 14 shots each minute. This battery can fire a barrage of 112 shots a minute, or one every two seconds. The machine guns, at the same time, would be delivering 400 one-half inch shells per minute to a height of 8,000 feet.

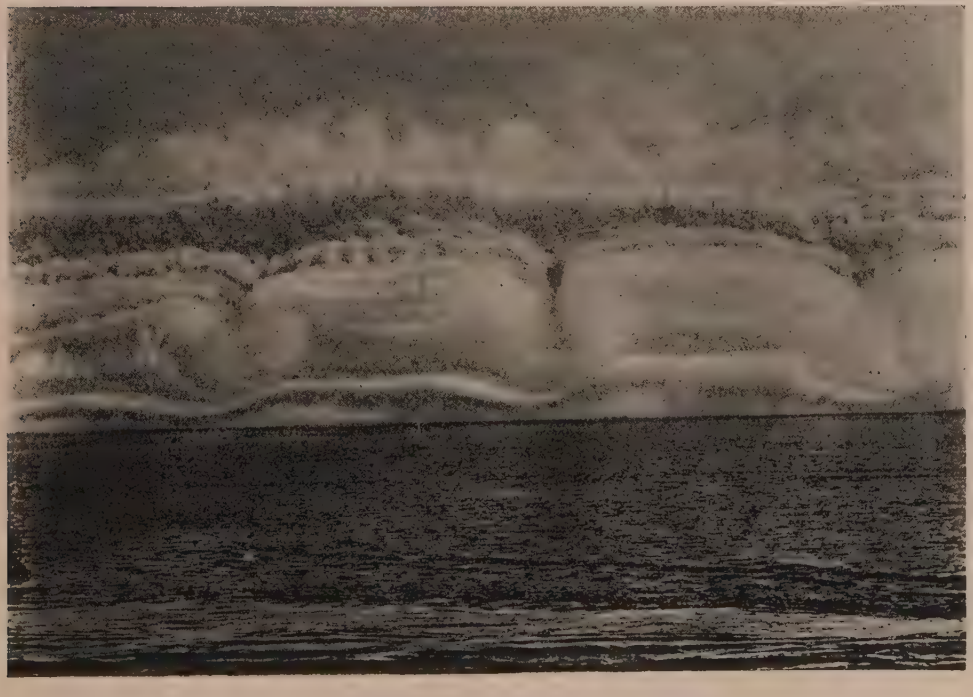
A bomb dropped from an altitude of 12,000 feet would reach the deck of the *West Virginia,* if she was helpless, in 28 seconds. Steaming at 21 knots the *West Virginia* would move nearly 1,000 feet in the same length of time. Zigzagging, or an abrupt change of course, would also add to the chances of the *West Virginia.* Comparing the 2,000-pound bomb to the chief missile of the battleship, the 16-inch shell, we find a very interesting comparison. While it takes 28 seconds for the bomb to reach the target 12,000 feet beneath, the *West Virginia's* 16-inch shell covers the same distance in less than five sec-

THE FAST SCOUT PLANE

Courtesy of "Flying"

A SUBMARINE TWENTY FEET UNDER WATER WITH SHADOW OF THE AEROPLANE ACROSS IT

MARINE BOMBER LAYING REMARKABLE SMOKE SCREEN



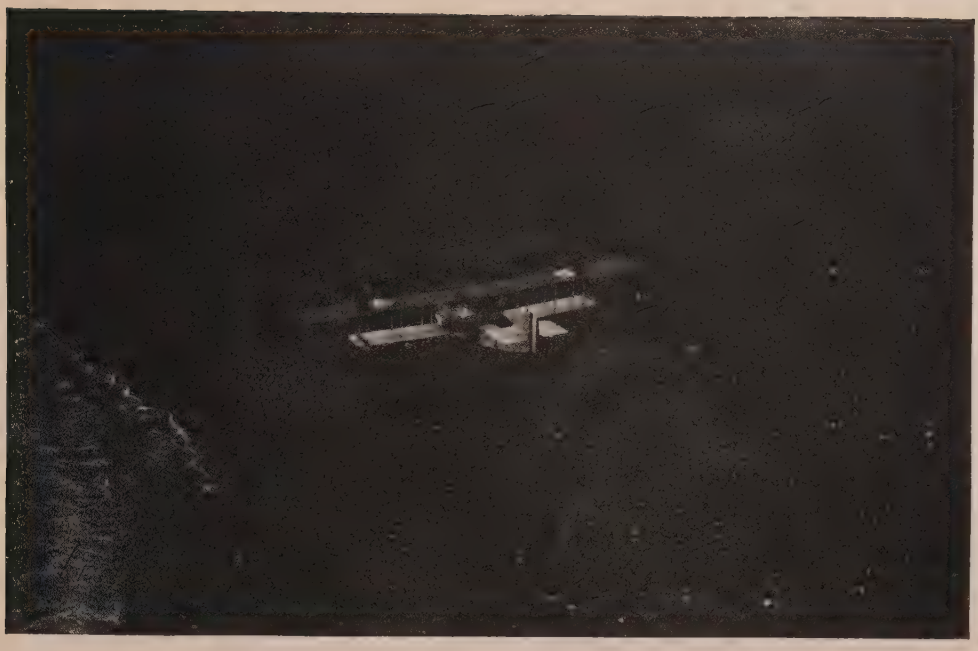
SMOKE SCREEN CLOUD ONE MINUTE LATER

onds. At 19,000 yards this 2,100-pound shell can penetrate any armor afloat, and can travel a distance of 20 sea miles.

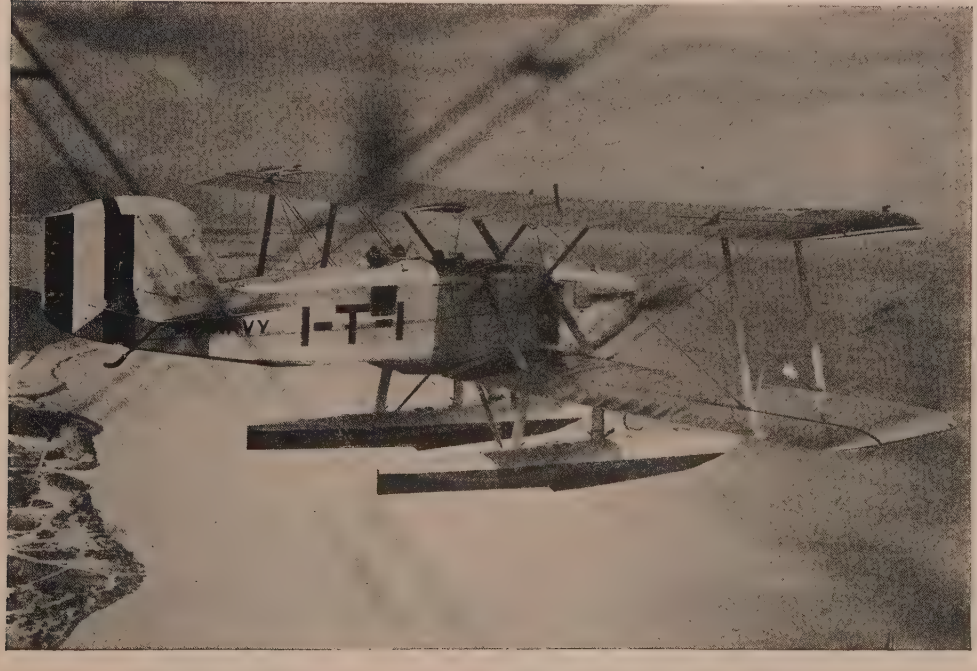
A very important function of the seaplane, of the scout or patrol type, is the location of an enemy force at sea. This is not done in a haphazard manner, but with all the care and navigation of a scouting unit of fast surface vessels. The area to be covered is mapped out, the speed, distance and course out and back of each plane determined upon before the flight begins, and the entire area combed by the squadron assigned to this duty. Long before a surface vessel could make contact through sighting either the smoke or masts of an enemy ship the aviator, from his lofty seat, can determine the presence of the foe. Even submerged submarines are not safe from the birdman's quest. To a depth of 75 feet under water they have been sighted from a plane flying at 1,000 feet altitude. Specially favorable conditions of light, water and under-surface bottom, however, marked these successful tests.

A ZEPPELIN ATTACK ON LONDON DEPICTED BY A GERMAN ARTIST

Flying never loses its interest and thrill. To fly for the Fleet adds to its charm, for then it has a purpose. Behind the fascination of it lies the lure of a new and powerful arm of the Navy that will fight its future battles thousands of feet above blue water, while below it the surface and under-surface craft are delivering their blows with gun and torpedo fire. Then the task of the birdman will reach to the peak where all his skill, quick wit and

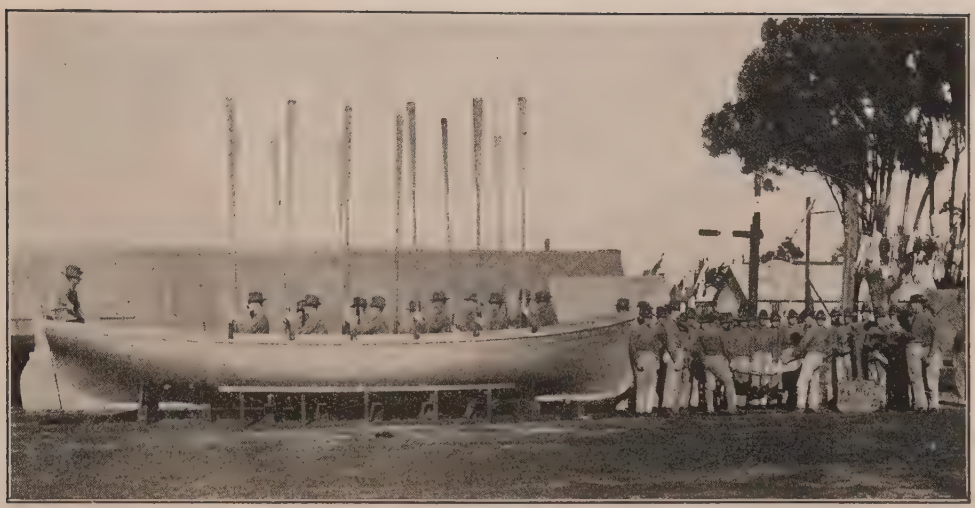


SEAPLANE SOARING ABOVE DESTROYER ATTACK SCREEN



THE POWERFUL LONG DISTANCE TORPEDO AND BOMBING PLANE

flaming courage must be translated into cool and deadly precision of maneuver and combat. The Commander of that aerial fighting fleet will have to shoulder a responsibility second only to the Commander-in-Chief. His keen and arduous training, his mastery of air strategy and tactics, and his fearless leadership will be put to the supreme test. From his lofty seat thousands of feet above the warring lines below, his vision of the far-flung action will be one that staggers the imagination. His correct interpretation of it by radio to the bridge of the flag-ship may well prove to be the deciding factor that will shape the Admiral's decision when the crisis of the battle is reached.



THE ROOKIES LEARN TO SLING A HAMMOCK AND PULL A CUTTER ON SHORE

XXIV

THE SOLDIERS OF THE SEA

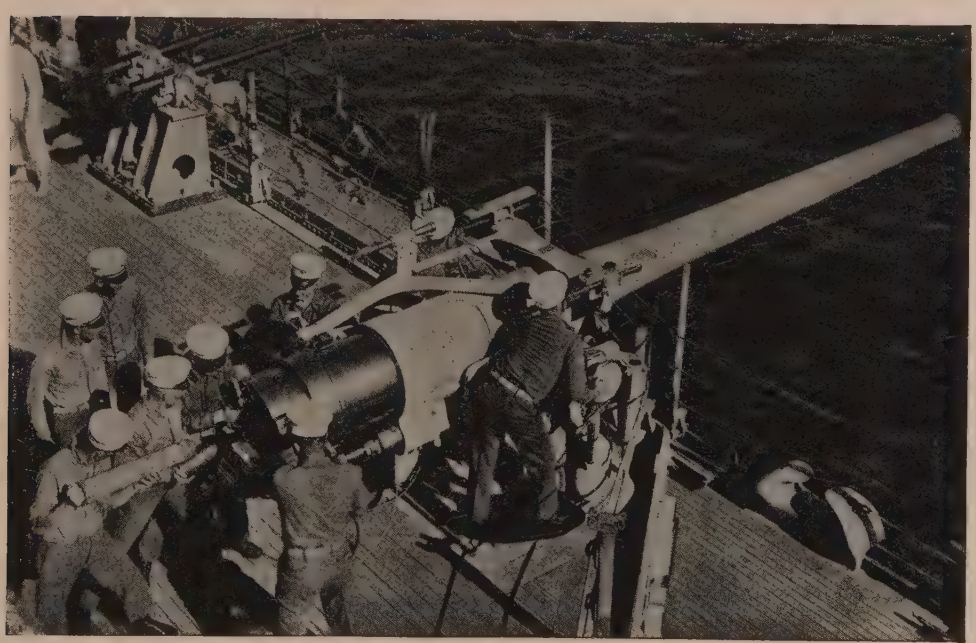
THE marines were the first of our regular services to don the American uniform, for before the Continental Congress formed the Army or the Navy it mustered in "two battalions of American Marines" on the tenth of November, 1775, as the first step to arm for the coming war with Great Britain.

In the early days of the Republic the marines were soldiers pure and simple, stationed on board our frigates and sloops-of-war as sharpshooters to pick off gun's crews on hostile ships when the "men of iron" fought their "wooden ships" at a pistol's length; and to quell the mutinies that broke out among the hard-bitten, undisciplined sailormen who had not learned the discipline of a man-o'-war. It is easy to see that little love was lost then between sailors and marines, for the latter did little of the ship's work and, in the expressive term of the sea, were known as "idlers," or "politicians."

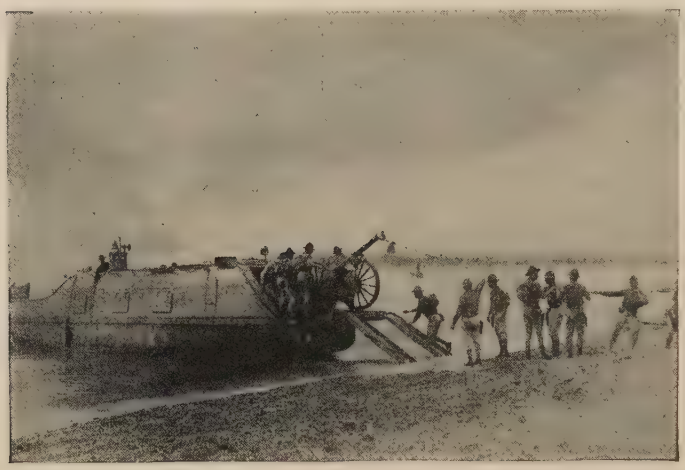
The American marine of to-day, however, despite his soldierlike uniform, is no "idler" on board ship. He mans the same boat, falls with his bluejacket shipmate, drills at the same batteries, and works at the guns in the frenzied endeavor of his ship to win the battle

DECORATING REGIMENTAL COLORS WITH FRENCH CROIX DE GUERRE

LOWERING MARINE SEAPLANE FROM TRANSPORT FOR MANEUVERS



A RECORD-BREAKING 5-INCH GUN CREW



LANDING SHORE DEFENSE GUN FROM ARMORED "BEETLE BOAT"

efficiency pennant that flies over the crack gunnery ship of the Fleet. He coals ship to the same music; double banks the thwarts with his shipmate in the liberty boats; shoots side by side on the ship's rifle team; and works with the brawn of his ship-hardened muscle for the winning touchdown. And when the ship's battalion lands in some tropical country to raise the Stars and Stripes on an alien flagstaff, the bluejacket, who has taught the marine how to make a bowline, or sling his hammock, follows without a moment's hesitation the advice of the sea soldier on scouting or street fighting.

The Spanish-American War ended the old days when the marine was content to act as an infantryman whose main duties on board ship were orderly and sentry duties. Now he must handle a twelve-foot ash oar in a seaway and do his trick at the brails in a sailing cutter. He must know how to rig shear legs and transport a seven-inch naval gun ashore and then move it to the top of a hill and there mount it where it commands the entrance to the port which the Fleet must use as a base. He must take his trick at coaling ship and getting ammunition and stores on

MARINE PACK TRAIN IN HAITIAN HILLS

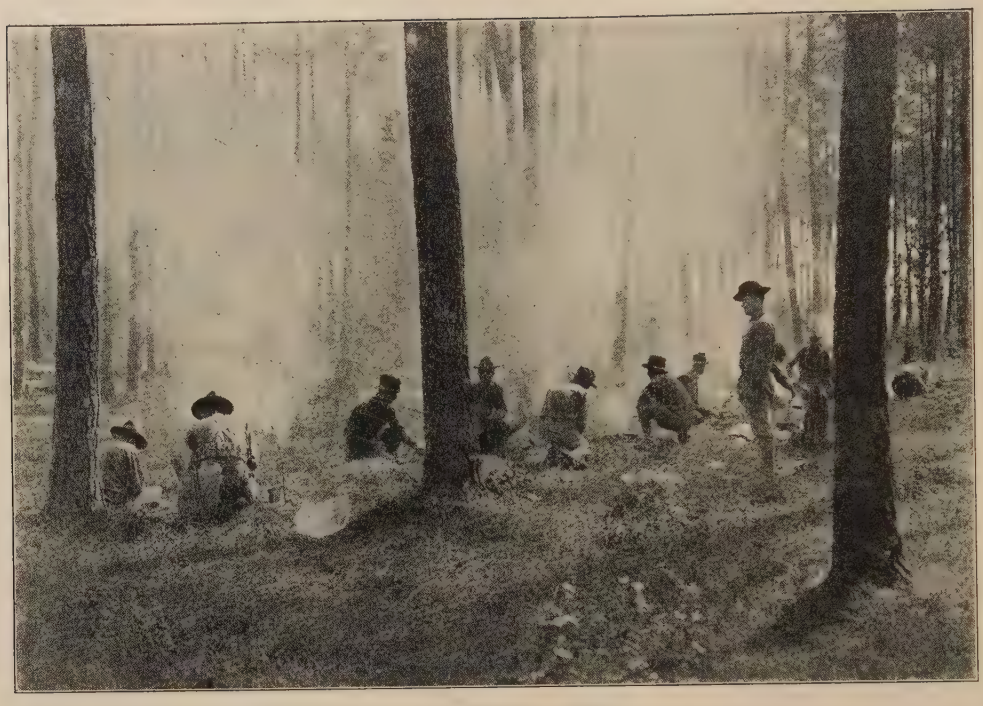
"SOLDIERS OF THE SEA"

board. He has his own part of the berth deck and his own battery of five-inch guns and must be ready at any hour of night to turn out and man them when the bugle shrills its call and the battle gongs warn of a night attack by destroyers. At sea he drills on decks that slant as the ship steams through long swells and lands the next day for a battalion review at a navy-yard. He keeps house with a sea-bag, ditty-box, and locker, and learns the mechanism of every piece aboard ship, from the quick-firing five-inchers to the delicate machine-guns that fire the service rifle's cartridge. The signals are an open book to him, and the marine has acquired the sea habit that makes him, as Kipling puts it, "soldier and sailor too."

MARINES SIGHTSEEING IN PEKING "TAXI"

The destiny of the Marine Corps has, from the birth of the Republic, been woven deeply into the warp and woof of the Stars and Stripes. They have fought in every sea fight in which the American colors have flown, and their song, "From the Halls of Montezuma to the Plains of Tripoli," is not an idle boast. Under Lieutenant Prestley N. O'Bannon they marched seven hundred miles through the North African desert in 1805 to haul down the flag of the Bey of Tripoli on the fortress of Derne, and run up the first American flag to fly over a captured fortress of the Old World. The Florida Indian

A CUTTER DRILL IN THE NORTH RIVER



COOKING IN THE FIELD

THE LEGATION GUARD AT PEKING, CHINA

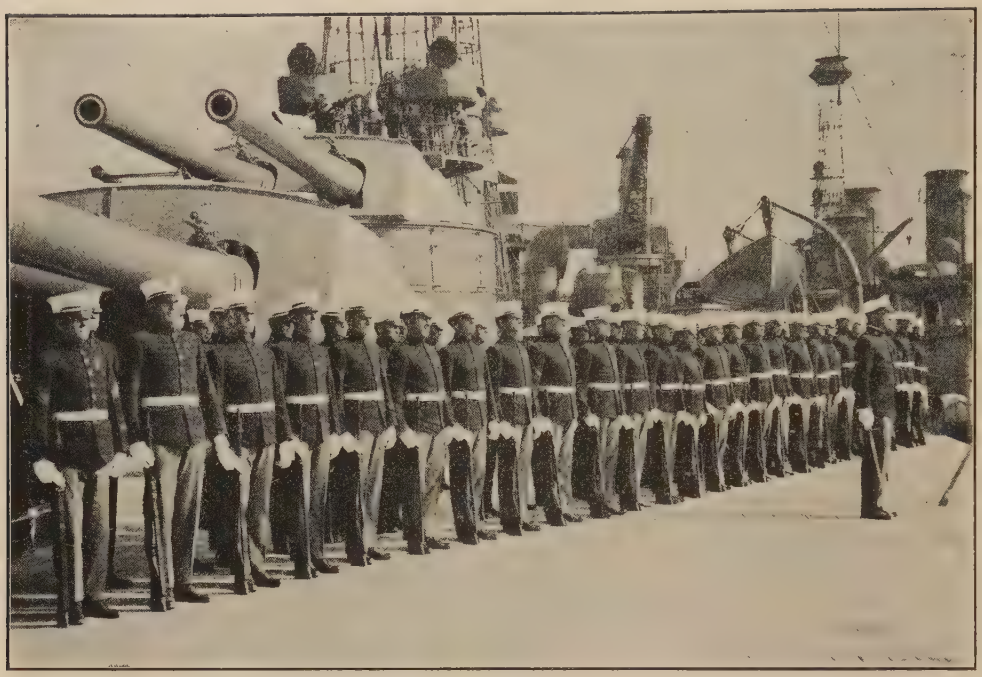
wars called them next, and they rushed Malay stockades seventy-five years before the Philippines came under our rule. The Fiji Islanders and the pirates of Korea were chastised by them six different times. With the Army they marched to Chapultepec in 1846; Robert E. Lee led them in the capture of John Brown at Harper's Ferry, and through the long Civil War they fought under Farragut and Porter.

When the Spanish War broke out the marines were the first troops to land at Guantánamo, where they drove out the Spanish troops to give the Fleet a base for supplies and repairs. Again, when the nations hurried relief columns to the aid of their legations at Peking at the time of the Boxer outbreak in 1900, they were the first American troops to land. Panama was an old stamping-ground of the sea soldiers, for under our treaty rights the United States held the right to land men to keep the railroad on the Isthmus free of interference from the revolutionists, who kept the canal strip in a turmoil for several years.

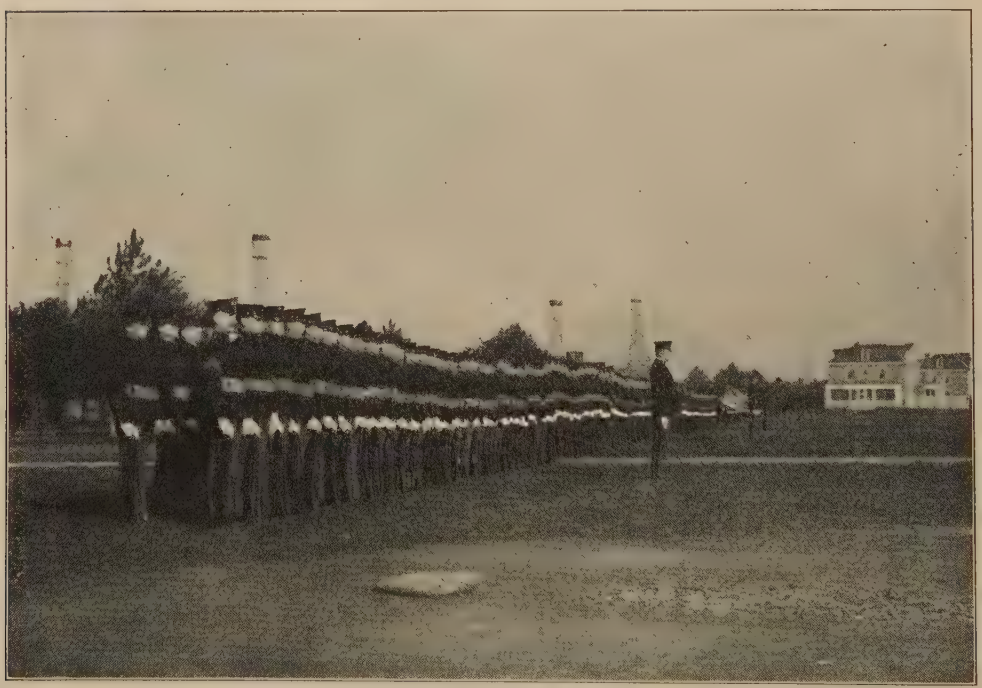
In more recent years the marines and bluejackets from the Fleet restored order in Nicaragua after a spirited campaign. In the capture of Coyotepe Hill, when the marines were ready to advance the bluejackets were ordered to be held in reserve, as their white uniforms would make shining targets for the defenders of the hill. With shoe brushes and yellow mud the sailors daubed their whites until they took on the khaki color of the marines' uniforms, and then all streamed up the hill that never before had been stormed. Again, when the Fleet was ordered to seize Vera Cruz in April, 1914, a brigade of marines from the United States and from the detachments of the Fleet landed with their bluejacket brothers and brought new honors to the flag in the three days of street fighting that ended in the surrender of the Mexican seaport. When the Fleet was able to withdraw, and Funston's brigade arrived from Galveston, the brigade of marines became, for the next six months, a part of the Army to all intents.

There came a year of quiet for the sea soldiers and then Haiti, a hotbed of revolutions and anarchy, needed a touch of what Theodore Roosevelt once described as the "loaded end of the Big Stick." Hardly had the marines restored quiet to the Black Republic before a regiment landed at Santo Domingo to repeat the work of their brother sea soldiers.

As the Marine Corps is a part of the Navy, and its military branch, we can land them at any spot where American interests are in danger, where to land any part of the Army would be equal to a declaration of war. Because of this rule of international law the marines have



THE MARINES OF THE "NEVADA"



REGIMENTAL DRESS PARADE AT LEAGUE ISLAND NAVY YARD

OFF DUTY ON A BATTLESHIP

seen service in almost every quarter of the globe, and this has made it a force that can be moved at the shortest notice, ready for any kind of fighting. When acting with the Fleet they keep their rôle as a part of the Navy, but when the Army is in charge, as at Peking and Vera Cruz in the later days, the adaptable marine is temporarily transferred to the Army for service until he is returned to shipboard or barracks. When a detachment of the Army is sent overseas it is no easy task to break up the routine of a post, and transports must be chartered, but it is only a bit of routine to send the marines. Their transport is their home, and the Fleet is their ever ready base of supplies.

The main duties of the marines today are to furnish detachments for all battleships and cruisers, ranging from fifty to seventy-five men under one or two officers; to furnish regiments or battalions for expeditionary work with or with-

OBSERVING ARTILLERY FIRE

out the Fleet; to furnish guards for navy-yards, wireless stations, and arsenals; to garrison our foreign stations in the Philippines, Guam, and Hawaii; guards for the American legations in Peking, China, and at other points; and to take care of the advance bases that the Fleet might establish in time of war. This last would be the principal duty in wartime. Out at San Diego on the Californian coast, and at the Marine Barracks at Quantico, Virginia, they are trained in large bodies for the duties of advance base work. With Pershing a full regiment of marines sailed as part of the first division of regular troops for service in France.

In war between the United States and one of the powers of Europe, that power would first try to seize a base near our shores, especially one in the Caribbean Sea, where its fleet could strike at the Panama Canal and from that base raid our coast and destroy our naval station at Guantánamo. It would therefore be the first duty of our Navy to seize and fortify all such bases first. The marines would be landed at these bases, fortify the harbor entrances with naval guns, mount searchlights, and put the base in readiness for a siege. From these bases our ships could strike at the enemy, to return for repairs and stores, trusting to the marines to drive off the enemy in their absence.

So at Quantico, Va. and San Diego the marines carry out the handling and mounting of the guns, the loading and unloading of transports, and the hundred and one tasks that they must later carry out on some tropical island. When the Fleet goes South the advance base regiment goes with it, and at twenty-four hours' notice a regiment could embark on the transport *Henderson,* with its guns, artillery, radio outfits, stores and supplies, motor trucks and armored cars, for either an expedition or the advance base task.

Some of the marines are specially trained as infantrymen while on shore, others to man the battalion of horse artillery, and there are still others for radio and signal work, for mining channels, and other special details. In the Santo Domingo campaign a squadron of motor trucks and armored cars operated in the field with the foot troops, and from headquarters columns were kept in touch by wireless.

The uniform of the marine is a distinctive one, and in its contradictions of the yellow chevrons of the cavalry, the red trouser-stripes of the artillery, and the slightly bell-bottomed flap of the sailor where the red stripes end, we have an index of the soldier and sailor who is neither one, and who is both. The bronze device on his cap is the western half of the globe, topped by an eagle, and backed by a fouled

anchor. With all his military appearance his talk is that of the sea. Where his army brother, deciding to reënlist, says that he is going to "take on for another hitch," the marine is going to "ship over."

The normal strength of the Marine Corps is one-fifth that of the Navy. Its ranking officer is a Major General whose duties correspond to that of the Bureau Chiefs of the Navy Department in responsibility and importance. The officers are drawn from the Naval Academy, from especially fitted non-commissioned officers, and graduates of distinguished military institutions. Once commissioned they are sent to the training schools of Quantico and Philadelphia for one year, and then are detailed for duty with the Fleet, at a foreign station, with the expeditionary forces, or on duty at a naval station.

When we entered the World War the Marine Corps was destined to write its finest chapter in its long story of service. From its peace-time strength of 14,000 it leaped to its maximum peak of 75,000. Thirty-thousand "leathernecks" served gallantly with Pershing and 1600 more performed naval duty on shore over there.

Most conspicuous of its duty was that of the Fourth Brigade of Marines that fought as a part of the famous Second Division. The Fifth and Sixth Marine infantry regiments and the Sixth Machine Gun Battalion comprised this gallant brigade. It fought with distinction on nine battle-fronts and every one of its units, for their citations in the French Army Orders, received the coveted French fourragere in the red and green colors of the Croix de Guerre as a part of their uniform, while their battle-flags were decorated with the Croix de Guerre.

At Belleau Woods, in the Chateau Thierry sector, the fine work of this brigade in June, 1918, when it wrested the woods from the oncoming German horde, and steamed the advance on Paris, won a unique distinction. The maps of France no longer bear the name of Bois de Belleau for the scene of that desperate fighting, for it is now known officially as Bois de la Brigade de Marine.

A total of 12,000 casualties, of which more than one-sixth were listed as killed in action, tells the story of this doughty marine brigade. French and American decorations to the total of more than 1,700 were won by its officers and men for gallantry in battle. Its successive commanders were Brigadier Generals Doyen, Harbord, Lejeune and Neville. General Lejeune was later promoted to command of the Second Division, in succession to General Harbord, the one army officer in the list. As head of this remarkable fighting unit at St. Mihiel, in the Champagne and in the Argonne-Meuse, General John Archer Lejeune not only won his laurels as one of the great divisional commanders of

the A.E.F., but the added distinction of having commanded a fighting force that was double in strength the whole Marine Corps at the time of our entry into the war.

Not only in France did the marines do their bit. They served on all the overseas battleships and in many of the oversea cruisers. Marine fliers saw active service with the Northern Bombing Group in Belgium, and were stationed at the Azores. In Santo Domingo and Haiti other brigades saw fighting aplenty. Another brigade was held in southern waters to forestall any enemy activities in the Mexican oil-fields, and others served in Cuba, China and Siberia.

At home they did their work guarding radio stations, naval magazines and ammunition depots, cable stations and at the naval bases.

Their mission as stated to-day is "To support the Fleet, or any part thereof, in the accomplishment of its mission, which means that the Marine Corps must always be ready to furnish detachments to vessels of the Fleet; guards for shore stations and garrisons for our foreign posts; and to maintain an expeditionary force that may be called on either to hold a base, or to wrest one from any enemy force.

A comparatively recent addition to the manifold activities of the Corps is its aviation branch, which has attracted, as in the Army and Navy, the most adventurous and daring of the younger officers. Primarily it exists as an adjunct to the Navy's aviation branch, but it has a double requirement for it must operate seaplanes when it is acting with the Fleet, and land planes when it is operating with the marines in a land operation. Not only do the marine fliers go through the Navy's flying schools, but many of them take the more advanced schools that the Army operates. The unit of formation is the squadron, and the Marine Corps squadrons are located on or near the coast, while others are detached to serve as a unit of any marine brigade which may be serving in such countries as Haiti. Here the flying is of the most difficult and hazardous nature. In Haiti, where a squadron is stationed, a flight across the island takes the flier over four successive mountain ranges that raise up to an altitude of 5,000 feet, with safe landing places far between over this formidable terrain of rough mountains, ravines and deep jungle.

As Kipling wrote, and it is equally true of the Yankee marine:

"There isn't a job on the top o' the earth the beggar don't know, nor do—
You can leave him at night on a bald man's 'ead to paddle his own canoe—
'E's a sort o' bloomin' cosmopolouse—
Soldier an' sailor too!"

Courtesy of "Our Navy"

ALL IN THE DAY'S WORK

XXV

HEROES OF THE COAST GUARD

IN the maritime world the United States Coast Guard holds a unique and interesting position. Maintained by the Government primarily to save life and property from the perils of the sea, it has never failed to respond nobly in defending the nation in times of war. The very guns with which the cruising cutters of the Coast Guard are armed, while used to hurl death-dealing shells at our enemies, are called upon in the piping times of peace to shoot life-lines to wrecked vessels for the purpose of saving the lives of the imperiled crews and passengers. In times of war the Coast Guard stands for the self-preservation of the nation, and when peace reigns it is our greatest agent to help those in danger at sea.

The Coast Guard, as now named and organized, did not come into existence until 1915, when Congress combined the then existing Revenue-Cutter and Life-Saving Services into the Coast Guard. The Revenue-Cutter Service was established in 1790 for the purpose of preventing smuggling and aiding in the national defense. In fact it was the first armed sea service of the United States, as no regular navy existed at that time. Before the Navy was organized in 1796 the vessels used for naval purposes during the Revolutionary War and forming the Continental Navy had been abandoned.

COAST GUARD CADETS AT NEW LONDON ACADEMY

The earlier revenue cutters were small, fast sailing vessels, of about 100 tons, each manned by about thirty officers and men and armed with cannon. Although diminutive in size, their crews were fearless and daring. Many deeds of bravery were performed, both in peace and in war. During the trouble with France in 1798 and 1799 one of these cutters, the *Pickering,* alone captured ten prizes in engagements with the French, and another cutter, the *Eagle,* captured five.

During the War of 1812 the first capture made was that of the British topsail schooner *Patriot* by the revenue cutter *Jefferson.* A total of fourteen British vessels captured, with their crews and guns, briefly tells the story of the prowess of the Revenue-Cutter Service in that war.

In the troubles with the Seminole Indians, several revenue cutters played so conspicuous a part as to win the praise of the naval officer in charge of the sea forces. In the war with Mexico five revenue cutters were engaged in the naval operations and performed valiant

Photo U. S. S. "Seneca," C. G.

ASHORE IN A NAVY YARD FOR DRILL

service in connection with the blockading fleet along the Mexican Coast. The cutters were engaged in the Paraguayan expedition, in the Civil War, and in the war with Spain. During the Civil War it was to a revenue cutter that the then Secretary of the Treasury wired his famous order, "If any man hauls down the American flag, shoot him on the spot."

It was to the captain of a revenue cutter that Congress awarded the only gold medal granted by that body for conspicuous service during the war with Spain.

Although gallant service has been rendered to the Government by the Coast Guard in every war in which this country has been engaged, it is its peaceful function of saving lives and property that has made it most famous. As our maritime commerce grew, the importance of the revenue cutters as aids to vessels in distress increased in proportion. For many years past the President has issued an annual proclamation directing all cutters along the Atlantic Coast to cruise vigilantly at sea from December 1st until April 1st for the purpose of lending aid to vessels in distress.

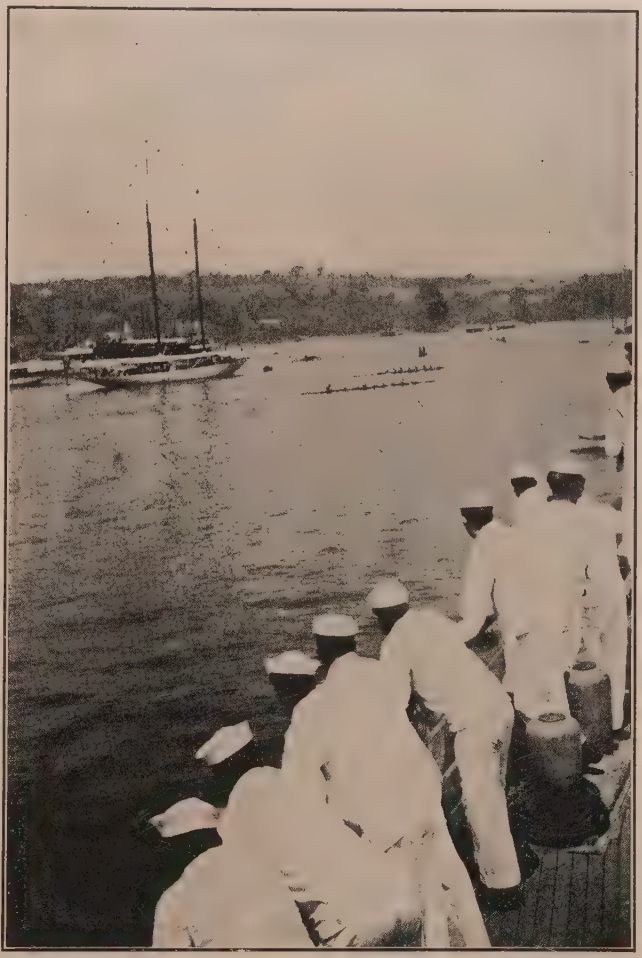


Photo by U. S. S. "Seneca," C. G.

COAST GUARD CUTTERS PATROL THE YALE-HARVARD BOAT RACES

So important did the services of these Government vessels become that there arose a general demand for similar aid to vessels in distress along the shores. Yielding to this demand, the former Life-

Saving Service was authorized by Congress and for several years it was operated under the direction of the Revenue-Cutter Service. Finally in 1878 its activities had grown to such proportions that it was organized as a separate bureau of the Treasury Department. At all of the more dangerous points along the Atlantic, Gulf, and Pacific Coasts and on the shores of the Great Lakes, stations were gradually built as the appropriations were made, so that when again combined with the Revenue-Cutter Service under the name of the Coast Guard there were 280 of these stations maintained by the Government.

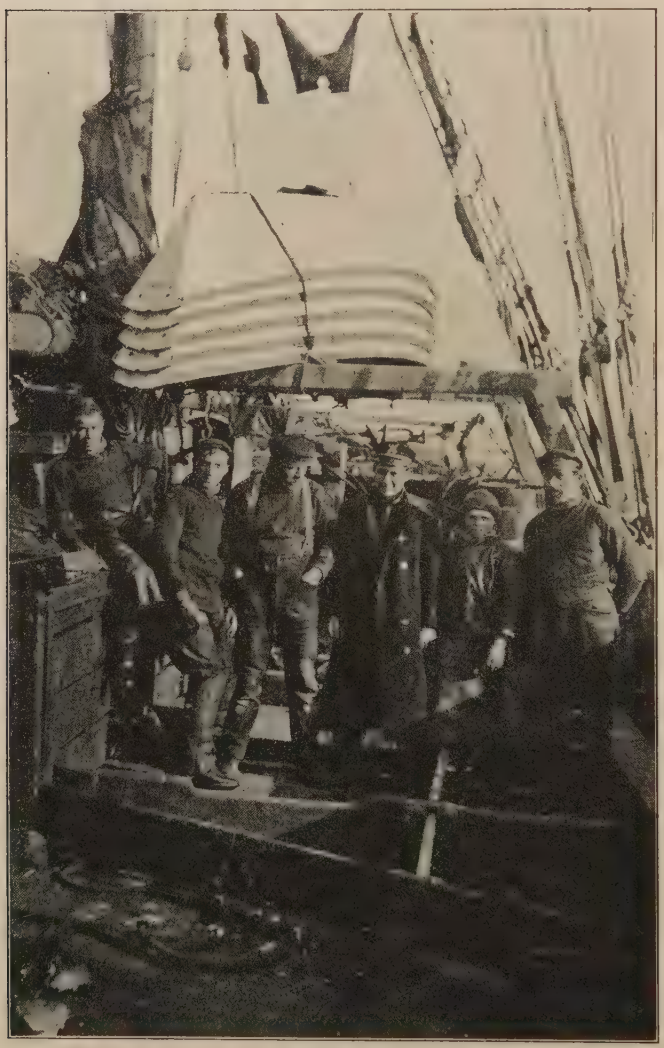


Photo by U. S. S. "Seneca," C. G.

A COAST GUARD SURGEON BOARDS FRENCH FISHING BARK TO GIVE MEDICAL AID

In several portions of our coast where commerce converges toward great cities, the stations are located from five to ten miles apart, so that it is possible to maintain a continuous patrol. In these vicinities, therefore, any vessel which goes ashore or is in distress near the beach may be certain of securing relief from the vigilant coast guardsmen. Each station is manned by a keeper and seven men, who maintain a constant lookout from a tower on or near the station, and in addition patrol the

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THE BREECHES BUOY TRANSFERS MEN FROM STRANDED SHIPS TO SAFETY

Photo by U. S. S. "Seneca," C. G.

TOWING OVERTURNED SCHOONER INTO PORT 400 MILES AWAY

Photo by Capt. E. P. Bertholf, U. S. C. G.

C. G. C. "UNALGA" ASSISTING STEAMSHIP "GEORGIAN" ASHORE ON COAST OF SOUTHERN CALIFORNIA

beach for about five miles each way, ever on the lookout for vessels in distress. At night the patrolmen carry lanterns and illuminating signals with which to warn vessels when they are approaching too close to the beach or to dangerous reefs and shoals.

In case a vessel goes ashore and boats cannot reach her to remove the passengers, a small line is shot over the wreck. With this small line a larger line can be hauled aboard, which, when made fast to a standing spar, is used as a means for hauling to and fro the breeches buoy containing one person at a time until all the crew and passengers are rescued. Attached to the line when first hauled off is a small piece of board, on which is painted in several different languages full directions for making the line and breeches buoy fast to the wreck. Sometimes instead of the breeches buoy a small life car shaped like a boat is used. In this car two or three passengers at a time may be hauled ashore in safety. By this service thousands of shipwrecked

Photo by U. S. S. "Seneca," C. G.

ICE PATROL IN THE NORTH ATLANTIC

passengers owe their lives to the prompt action of the life-savers using these ingenious devices.

Photo by U. S. S. "Seneca," C. G.

THE HUNT FOR DERELICTS

Probably the majority of the cases of assistance rendered by the Coast Guard stations are by the use of the surfboats, from two to five of which are supplied to each station These boats are especially designed to be launched through the most treacherous surf, and to withstand the stormiest of seas. Whenever the condition allows it, these surfboats are propelled by gasoline engines, usually two to each boat, which operate twin screws. The typical power surfboat is twenty-six feet long, and is of the self-bailing type. This is arranged by having the bottom portion of the boat built water-tight and decked over to a height about four or five inches above the water line. If the boat ships a sea the buoyance of the water-tight portion raises the boat, and the water runs out through the scuppers fitted with non-return valves along the sides.

CREW GATHERING WILD BIRDS' EGGS ON ALASKAN ISLAND

Another type of boat now much used is the power lifeboat, a small craft thirty-six feet long, sturdily built and capable of making eight to ten miles an hour. These boats are self-righting and self-bailing and are operated by stations located near bays or inlets

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RUNNING OUT THE SURF BOAT

OFFICERS AND CREW OF THE "MANNING" IN ALASKAN WATERS

where it is feasible to run out to sea over the bars or harbor entrances. The power surfboat, being much lighter, is hauled along the beach on a boat wagon, usually drawn by horses, and is launched through the surf at a point as near to the wreck as it is possible to get. As many as forty people at a time can be rescued by the power lifeboat, and possibly ten or twelve shipwrecked persons may be taken into the surfboats in addition to their crews. Many brave deeds of rescue are performed with these boats, and the records of the Coast Guard teem with incidents of lives saved under the most trying circumstances.

While the activities of the Coast Guard stations are confined to rescue work along the shores, the cutters of the Coast Guard form a sea life-saving agency, hunt down and seize the rum-running ships to enforce the prohibition law—using converted naval destroyers for this onerous duty to reënforce the fleet of cutters. All sea-going cutters are equipped with radio apparatus, and of recent years the great majority of the rescues effected by them have been in answer to calls of S. O. S. from vessels which are equipped with wireless apparatus and which themselves are in trouble, or have sighted other distressed vessels not equipped with this wonderful invention of Marconi. Frequently the cutters and stations work together in assistance to distressed vessels. Whenever vessels are sighted offshore in distress, the Coast Guard patrolmen telephone the fact to the most available radio station, which, in turn, sends out a broadcast message for the nearest cutter.

The Coast Guard cutters are of two principal classes: harbor cutters and cruising cutters. The harbor cutters are usually small vessels about one hundred feet long and of the tugboat type. You can see them at all the leading seaports of the country, where they are regularly stationed and perform services in connection with the customs houses. Every incoming foreign vessel must be boarded by a cutter and its papers examined before it is allowed to come to its pier to discharge cargo. Harbor cutters are also used to patrol regattas and to enforce anchorage regulations at the ports of New York, Chicago, and at other places where it is desirable. In New York Harbor, for instance, if vessels were allowed to anchor indiscriminately there would be much confusion and congestion. If a vessel should anchor off any of the great ferries to Brooklyn or Jersey City it would seriously interfere with the traffic. To avoid this, certain portions of the harbor are set aside as anchorages, usually at places where anchored vessels will not interfere with the ordinary routes of ferryboats and

other traffic. If vessels should anchor outside of these restricted areas they are at once boarded by the cutter and told to move. Failure to comply with instructions after the first warning usually results in a fine of one hundred dollars. In more serious cases the masters of the offending vessels may lose their licenses. As a rule, the vessels are anxious to comply with the law, and offenses are limited to persons who are ignorant of the regulations.

The cruising cutters are, in general, vessels of about one thousand tons displacement and correspond closely to the gunboat class in the Navy. They cruise in the most severe weather and are provided with all the necessary appliances for rendering aid to vessels in distress. They have unusually large capacities for coal and water and thus keep the sea for long periods in search of distressed vessels or of derelicts.

Courtesy of "Our Navy"

A COAST GUARD CUTTER IN NORTHERN WATERS

The destruction of derelicts is one of the main functions of the Coast Guard and annually an average of thirty of these menaces to navigation are either destroyed or towed to the nearest port by the cutters. Two of the cutters are detailed in March of each year to patrol the ice-fields of the North Atlantic Ocean in order to warn approaching vessels of dangerous bergs or floes which are in their paths. This service was begun shortly after the destruction of the *Titanic,* which struck an iceberg and was lost with enormous sacrifice of life on April 15, 1912.

On the Pacific Ocean two or three cutters are detailed annually to patrol the Bering Sea for the purpose of preventing the destruction of the seal herds which congregate at the Pribilof Islands during the summer months. An international agreement between the United States, Great Britain, Russia, and Japan makes it illegal for seals to be taken in the water by anybody. This practice is known

as pelagic sealing, and to carry out this international agreement the cutters cruise actively in these waters throughout the season.

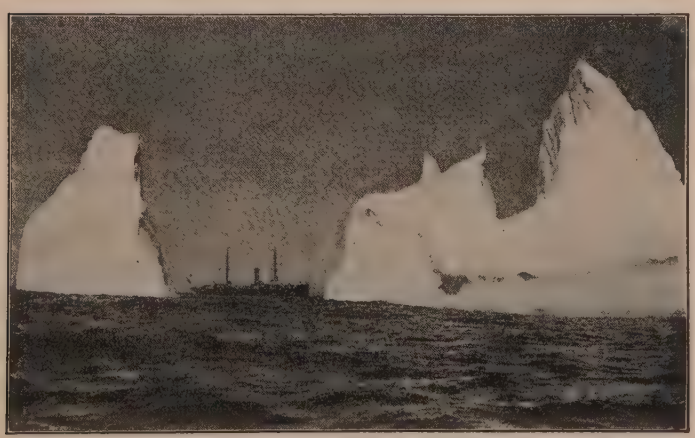
Courtesy of "Our Navy"

THE COAST GUARD CUTTERS ARE SWORN FOES TO DERELICTS

One cutter, the *Bear,* makes an annual cruise to Point Barrow and the northernmost portion of Alaska. This is the only vessel that ever reaches many of these distant places, and great benefit is given to the native population by enforcing the laws and rendering medical assistance to the sick.

For the past ten years another cutter has been detailed to convey the United States Court from port to port in the remote stretches of Alaska to try violators of the law. Owing to the very poor transportation facilities there is no other means of reaching these outlying districts.

On the Atlantic Coast one cutter, the *Androscoggin,* is detailed to accompany the American fishing fleet on its cruises in the waters off Newfoundland and Nova Scotia to render medical and surgical aid to the fishermen.



ON PATROL IN ICY WATERS

All portions of the coast of the United States proper, and of Alaska, Porto Rico, and the Hawaiian Islands, are patrolled by the cutters to give aid to the distressed and to enforce navigation and motorboat laws. On board these

ships strict military discipline is maintained, the same as on vessels of the Navy. The crews are drilled in the use of the six-pounder guns, with which every cruising cutter is armed. Simply by direction of the President the Coast Guard can be transferred to the Navy in time of peace, and in war time it automatically becomes a portion of the regular Navy, under the direction of the Secretary of the Navy. In the World War this highly trained force was a part of the Navy, and upheld its own both overseas in the war zone, and in home waters, with great distinction.

To show the value of the services which the Coast Guard renders the public in times of peace, it may be interesting to know that on an average 1,400 lives are annually saved from drowning, and that on board ships assisted there are an average of from 15,000 to 18,000 persons. The value of the property annually saved from destruction by the elements amounts to over ten million dollars, whereas the total cost of the Coast Guard to the Government is approximately five and one-half millions for the same period. In addition to these services performed, in a recent year 179 vessels were warned that they were running into danger along the coasts, and 93 fires in buildings at wharves and other structures bearing on the shore line were extinguished; the bodies of 734 persons who met death by drowning were recovered; numerous vessels were piloted into safe places; lost children were restored to their parents; criminals were apprehended; food, water, and fuel were furnished to crews of distressed vessels; and in fact the Coast Guard is called upon for almost any service that the public requires along our seacoasts. The crews are always willing and obliging, and are called upon at all hours of the day and night to aid suffering humanity. The military training with which they are instilled makes them highly efficient for quick response to calls for assistance.

To train the commissioned officers of the Coast Guard there is maintained at New London, Connecticut, the Coast Guard Academy,

Photo by Capt. E. B. Bertholf, U. S. C. G.

A HERD OF SEA LIONS

which is operated along lines similar to the Naval Academy. No political influence is necessary to secure appointments as cadets in the Coast Guard. Examinations for appointment are strictly competitive and are open to all young Americans who possess the necessary qualifications. The instruction is both theoretical and practical. The Coast Guard cutter *Itasca,* formerly the *Bancroft,* built for the cadets of the Naval Academy, is annually detailed to take the Coast Guard cadets on a cruise extending over a period of from three to four months. Practical instruction in seamanship, navigation, and engineering is given all cadets, and at the end of the three years' course they are proficient in the duties of a third lieutenant, to which rank they are appointed. The commissioned ranks of the Coast Guard correspond to similar ranks in the Army and Navy.

Republics are notoriously ungrateful, we are told, but our country is keenly alive to the self-sacrificing heroism that has always marked its gallant Coast Guard.

Photo by McAboy

THE NAVAL ACADEMY'S ATHLETIC FIELD

XXVI

THE UNITED STATES NAVAL ACADEMY

IN the early days of the American Navy our officers began as mere boys, scarcely in their teens, to learn the duties of their profession on board the frigates. It was a rough and ready school, and it developed such famous officers as John Paul Jones, Stephen Decatur, David Farragut, and others who won distinction in our early wars. They were stationed in the waist or midship portion of the ship while under way, or in battle, to pass orders along, and for this reason they were known as midshipmen. It was only in recent years that the old name was brought back after the term "naval cadet" had been in use for several years, and its return was a popular change.

As the Navy grew, however, its officers were the first to see that they needed more training than was possible aboard ship, and for

years they fought for a better school than the decks of the frigates and sloops-of-war for the training of the midshipmen. Finally, in 1845, their fight was crowned with success. George Bancroft, the Secretary of the Navy, gave them the Naval School, and to-day many officers who are graduates of the modern Naval Academy refer to it as the Navy School.

It was founded at Annapolis, the capital of Maryland, where the Severn River enters the Chesapeake Bay. The old round walls of the Army post at Fort Severn were the first quarters for the middies, and later the Government bought the beautiful grounds and old mansion of Maryland's colonial governors. There was little system in the arrangement of the old buildings, and few of them had any distinction of beauty in themselves until the present new group of buildings took their place early in 1900.

But the fine old elms that shaded the walks and the vistas of the bay sparkling in the sunlight had a great charm. Annapolis was a sleepy old town, rich in history, and full of splendid types of colonial architecture. Several signers of the Declaration of Independence lived there or had their plantations in the rolling countryside. It was a fine location for the Navy School, rich in traditions, and of a quiet atmosphere.

Sail changed to steam, and wooden ships to iron, and the Naval

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THE ACADEMY CAMPUS

REGIMENTAL PARADE

School kept pace with the changes and progress of the Navy. To-day the Naval Academy is abreast with naval progress and as science works changes in the Fleet the instructors at Annapolis keep their midshipmen in step with reforms. Early in the Civil War the Navy School was moved North to Newport, Rhode Island, and then back to its old moorings in 1865. Admiral David D. Porter, one of the naval heroes of the war, became its Superintendent and under his wise rule began the modern Naval Academy.

Photo by Paul Thompson, N. Y.

BACK FROM THE SUMMER CRUISE

A board of naval officers recommended sweeping changes in the equipment of the Naval Academy in 1895, the chief of which was a complete set of new buildings to be grouped harmoniously with the natural beauty of the grounds. Congress fell in line with their views and in the spring of 1899 the changes were begun.

The Naval Academy of to-day has a great quadrangle or campus surrounded by massive buildings. The midshipmen are quartered in Bancroft Hall, facing the campus on one side and overlooking the parade ground in the rear, with the blue Chesapeake stretching away as far as the eye can see. Bancroft Hall is flanked on one side by the armory, and on the other by the boat-house. Across the square of old turf and great elms, its walks lined by such trophies as captured cannon, the bronze bell brought back from Japan by Commodore Perry, and Tecumseh, a famous figurehead of the old frigate *Delaware,* lies the Academic Building. The Physics and Chemistry Building is on one side and on the other the Steam Engineering Building. The chief

building on the other side is the Memorial Chapel. Its striking dome is a landmark for miles. Under its cover, in a specially built crypt, lies the body of John Paul Jones, brought back from an obscure grave in France through the efforts of General Horace Porter, our Ambassador, by a squadron of American men-o'-war, in 1906. The ceremonies were attended by the President and his Cabinet, the French Ambassador and other distinguished men. In Memorial Chapel the graduation exercises are held and the President comes from Washington to give the diplomas.

Officers' quarters and other buildings line the walks, all of which bear the names of famous naval officers. It was in Buchanan Row that Admiral Cervera and the other Spanish officers captured at Santiago were quartered until the close of the Spanish War.

Besides the parade grounds, with its room for the drill of a brigade, are other spaces for drill, and well-equipped fields for football, baseball and other sports.

The main street of "Crab Town," as the irreverent middies know Annapolis, leads directly to the main gate of the Naval Academy. Here is the midshipman officer of the day, and when you pass through

DRILL WITH THE HALF-RATERS

you are at once struck by the scene. The grounds and buildings are as immaculate as the decks of a ship. A column of midshipmen is swinging along under its officers to some formation. The sound of a bugle comes from a distance, and on the half-hour comes the measured strokes of a ship's bell. Every one seems to be in blue uniform, and over it all lie the outward signs of the perfect discipline that is the pride of the Academy. The same controlling features of Admiral Porter's days are still in force.

Let us follow a group of candidates who arrive in Annapolis for the entrance examinations in May. Here is the son of an Army or Navy officer who has grown up in military surroundings, and who walks with the "brace" of a midshipman in his carriage. The boy with him is from an inland town where a ship is unknown; and still another hails from a fresh-water town in the interior. Another, from a great Eastern city, predestined by his father to be a lawyer, is on the threshold of his ambition to follow the sea. Instead of Harvard the Naval Academy is to be his Alma Mater. They must be between the ages of 16 and 20, of sound body and good physique. They must be well grounded in algebra, arithmetic, geometry, English grammar, and the history of the United States, to pass the strict entrance examinations.

Once past that ordeal they take the oath of allegiance and are now midshipmen in the United States Navy. They doff their civilian attire for the navy blue blouse and trousers. On their sleeves is a thin stripe of gold braid and a star. On their collar is a gold anchor, and on their cap the fouled anchor of the midshipmen brigade. The brigade knows them as plebes, but the old custom of hazing or running the plebes died a natural death several years ago.

Uncle Sam takes his middies at a critical period in their lives. He isolates them for four years from outside influences and from the start breeds in them the high standards and traditions of honor that are the Navy's.

Under the law each Senator, Representative, and Delegate of Congress has the appointment of three midshipmen. The District of Columbia is entitled to two and Porto Rico to one. The President appoints ten more at large from the country and one hundred vacancies are open each year to the enlisted men of the Navy. In 1916 Congress raised the strength of the brigade from 1,200 to 1,700 midshipmen.

Our new middies soon learn that their pay is to be $720 a year and in addition ration money at the rate of seventy cents a day. From this sum, which is retained by the Academy authorities, each midship-

man receives his uniforms, books and other necessaries, and a small monthly sum for spending-money. Each year enough of this sum is held out so that on graduation the newly-fledged ensigns have on hand

Photo by Paul Thompson, N Y.

RESTING PLACE OF JOHN PAUL JONES

PRIZE COMPANY RECEIVES COLORS

money with which to buy their swords and uniforms to report to the Fleet.

From reveille to taps the plebes are busy with studies and routine drills. They learn the Swedish setting-up drills, infantry exercises, how to knot and splice, to handle small boats under sail and oars, and how to swim. At night they study in a room simple as the old quarters in the steerage of the frigate where the first American midshipmen lived. There are only a table, wardrobe, and chairs for furniture and there is neither a carpet nor a rug on the spotless floor, nor pictures on the walls. What a contrast such a room is to the average college room!

While the plebes make ready in the summer for the academic year, which begins for the brigade early in October, the midshipmen of the three other classes are off on the summer cruise. This yearly cruise is one of the most attractive features of the Naval Academy's course. In a squadron of second-line battleships they cruise one year to European countries. The next year the cruise may be to the West Coast and the Hawaiian Islands, or down to the interesting republics of South America.

Long before "June Week"—with its rounds of exhibition drills, its dances, and its ceremonies—rolls around, the plebes are erect and strong, faithful and alert in obedience and orders, and snappy in the precision of their many drills. They have absorbed much of the Naval Academy's code of honor. They have learned how to dance as well as how to drill and shoot, and some have already distinguished themselves on the many athletic teams that wear the Navy's insignia. Some

MIDSHIPMEN UNIFORMS

1—Full Dress—white trousers
2—Service Dress—blue with overcoat
3—Service Dress—white
4—Service Dress—white trousers
5—Full Dress
6—Service Dress—blue
7—Service Dress—blue white hat

have played in the great game against West Point and won the yellow N of the eleven. Others have made the baseball team and its white N. In track athletics, rifle and pistol shooting, in sailing or swimming, in tennis or wrestling, in gymnastics or fencing, still others have won honors. A few have won their seats in the eight-oared racing shell and swept down the Severn to the finishing-line ahead of a crack college crew. In spite of the limited time for athletics at

MAIN PART OF ACADEMY GROUNDS

the Naval Academy it has ranked for years with the best of the colleges in every form of outdoor skill.

For less strenuous recreation there is always the broad Chesapeake for sailing, rowing, and swimming parties. On Saturday afternoons there are the college matches in the season; and on Sunday afternoons and evenings the midshipmen are allowed to visit in Annapolis or seek other recreation. The Armory is the scene of frequent hops and more informal dances, and its background of colors and signal flags, stacked arms and parked field-pieces, makes the graduating ball a brilliant spectacle.

With the end of "June Week" our plebes are now members of the third class, or, as the brigade terms it, "youngsters." Only a scant month of each year since the day of that oath of allegiance to

the Government have they left the boundaries of Annapolis. Up from Annapolis in a special train they have journeyed with the rest of the brigade to cheer the eleven on in its annual battle with West Point. If you have never seen the brigade file into the Polo Grounds with the Naval Academy band playing the Navy's favorite, "Nancy Lee," you can hardly imagine how the blue-overcoated and white-gloved

MIDSHIPMEN PASSING THROUGH PANAMA CANAL

midshipmen have looked forward to this great break in the yearly routine.

On through the rest of the four-year course the midshipmen are never out of some military formation during working hours except when they are actually in their quarters. They are mustered and marched to and from recitations and lectures, drills, and meals. All day long companies and divisions are falling in and being dismissed on their return. Bugle calls wake the echoes of the Academy Grounds from reveille at six until taps at ten.

The subjects change constantly as time passes. There are seamanship, ordnance, navigation, engineering, mathematics, physics, chemistry, electricity, French and Spanish, drawing, and law to be

mastered. Much of the work is practical and on the cruises the middies do the duties of every grade of the seamen and engineering ratings. The last year is mainly of a professional character, for the first-year men are approaching the time when they must take up the duties of officers on a modern man-o'-war.

From the first-class ranks are chosen the midshipmen officers of the brigade, a very practical way of learning the habit of command. The brigade is a formidable one to handle, organized into three or four full-strength battalions. In the old days the purely military drills were very unpopular with the midshipmen, but the modern naval officer must be expert in artillery and infantry maneuvers as well as his cadet brother at West Point. In recent years the middies have suffered little in comparison with the gray-jacketed battalion from West Point when the sister academies have appeared together in public.

The organization under which the work of converting boys in their teens into full-fledged naval officers is similar to the West Point method. At the head of the Naval Academy is the Superintendent, holding the rank always of Rear-Admiral. Next comes the Commandant, and then the heads of the various departments with their assistants. The majority of the instructors are naval officers, while in the departments where modern languages, English, and law are taught there are many college graduates as instructors. The Department of Discipline is perhaps the most important in the eyes of the brigade. This department takes charge of the conduct of midshipmen and makes careful note of the efficiency of any middy placed in a position of authority or responsibility. Demerits awarded for the breaking of any Naval Academy regulation not only bar the gates for him on holidays but lower his standing in his class. Many of the escapades looked upon lightly at college have more serious results here, and any midshipman guilty of hazing is sure of dismissal. Each offense has its particular punishment under the code that is iron-bound.

When the fourth "June Week" arrives the first-class men are allowed many privileges, which are all the more appreciated because of the inflexible routine that has surrounded them for four years. They have had a month's furlough following each practice cruise. These furloughs and the trips to the Army-Navy football game each fall are the only gaps in the long training. They are ready to break ranks for the last time and report after the graduation furlough to their ships as ensigns. Many go to the Battleship Fleet in the Atlan-

tic and others to the Cruiser Squadron of the Pacific. Others have orders to report to a cruiser or gunboat on the Asiatic Station and some to either the submarine or destroyer forces. It may be years before room-mates meet, but then it will be in uniform in some port of the Seven Seas.

The Naval Academy deserves well of the American people. It has never failed to give to the nation its quota of keen, intelligent, well-disciplined junior naval officers. They not only have served their country with distinction in every naval fight in our history, but in the Far East, in the unsettled countries that border on the Caribbean, and in every other corner of the world, they have settled diplomatic problems with a skill and firmness that often have averted war.

SETTING UP DRILL KEEPS BLUEJACKETS FIT

XXVII

ATHLETICS IN THE FLEET

IT would seem to a landsman that the Fleet, with its monster ships of the line, its swift destroyers, grim submarines, trim cruisers, and its thousands of bluejackets and marines keyed up to instant readiness for battle, would have little time or encouragement for frivolous athletics. But athletics play a big and useful part in the Fleet's routine and nothing adds more to the contentment and efficiency of the Navy. Not only do its officers—from the Admiral, his sleeve heavy with gold lace, down to the ensign just out of Annapolis, with one slim stripe on his sleeve—stamp athletics with wholesouled approval, but so does the Government by official action.

Uncle Sam knows its value and appropriates thousands yearly to buy uniforms and athletic supplies that a university would be proud to own, gives trophies and pennants to the winning teams, and arranges an all-year-round schedule for ships and men to follow.

It was the Duke of Wellington who said that the battles of Eng-

land were won on the athletic fields of Eton. The American naval officer of to-day will tell you that due credit will go to the athletics in the Fleet when our future sea fights are won. The old adage that "All work and no play makes Jack a dull boy" goes hand in hand with the knowledge that athletic competitions develop the cool head, the strength, and the headlong courage that modern naval battles demand of the man-o'-war's-man.

The Navy's policy is not to develop a few brilliant champions, but to encourage every man in uniform to put on the cleated shoe or the track jersey. There is hardly a form of sport that is not included in the Fleet's busy year. With this variety and the ship rivalry, interest in athletics never flags from January to December. When it is recalled that every officer and man has had to pass a rigid physical examination to enter the Navy, it is easy to see that the Fleet has material for its teams that any college coach would envy. Many of the officers have distinguished themselves as star athletes at Annapolis and in them the Fleet has a corps of coaches. In competitions one officer is allowed to play on each team with the exception of the track team. Others help in training the teams, and on the athletic

Photo by Paul Thompson, N. Y.

HALF AN HOUR AFTER ANCHORING

field the bulkhead of rank between officer and man is forgotten and no service in the world is so democratic. The crews, too, are in training all the year round with their daily routine of drills and physical exercises, regular hours, wholesome food, clean habits, and life in the open.

The recruit, before he is judged fit to wear the ship ribbon of a man-of-war, has to pass through a stiff course of physical exercises at the training station to which he is first ordered. Here he has his

START OF A WHALEBOAT RACE

teams and outside matches, and the stations are to the Fleet as the preparatory schools are to the colleges in supplying fine material. When he comes up the gangway of his first ship with sea-bag and hammock he finds chance for distinction in a greater field. Every battleship or cruiser, and every destroyer squadron, has its complete organization. The Captain appoints an Athletic Officer who has general charge of all teams. He also selects other officers, who have direct control of either football, baseball, boat-racing, track and swimming, basketball, boxing, and wrestling or gymnastics.

The athletic season opens with the Summer Drill Period when the Fleet unites at a northern port. One week of this period, in which the Fleet fights an imaginary invader and carries out drills

A NAVY RACING CUTTER

Courtesy of "Fleet Review"

THE WINNING BOAT CARRIES A BROOM IN THE BOW

Courtesy of "Our Navy"

THE WINNING BOAT'S CREW

day and night, is known as Athletic Week. War is forgotten and all drills and work are practically suspended. Athletics have the "right of way," as the sailormen put it.

The sailing and rowing regattas fill out the greater part of the Athletic Week. Of all the sports that fire the Fleet with enthusiasm none outranks that of the pulling races. Races rowed two or three score years ago, when American cutters and whaleboats showed their heels to the pick of foreign navies, still live in the traditions of the Navy and are told on the forecastles and in the wardrooms. It is the favorite test in which Yankee tars meet their international rivals.

At times, such as the Brazilian Rebellion of 1893, and in 1914 during the Mexican Insurrection, men-of-war of all nationalities are assembled in the harbor. On such occasions the unsettled conditions

of the country frequently prevent the usual granting of shore leave. Ships of all the nations then resort to international contests in rowing, sailing, boxing, etc., the competition in the various regattas and contests being most spirited. The indulging in such athletic contests not only inspire patriotism, and pride in our own country's flag, but promotes good international feeling among the representatives of the rival countries participating.

Courtesy of "Our Navy"

AFTER THE STARTING GUN

Courtesy of "Fleet Review"

WHISTLING FOR A BREEZE

Rowing is the natural sport of sailormen. Baseball may number more followers, and football is tenderly regarded by the Fleet; but when the crack crews line up for the starting-gun, baseball and football are forgotten idols. The decks are white with the massed ship companies, and when the winning crew sweeps across the finishing-line its ship cuts loose with wild cheers, with booming whistles, and up to masthead swings a broom, the emblem of sweeping the seas of all rivals.

The Navy racing cutter is a far different craft from the slender racing shell of

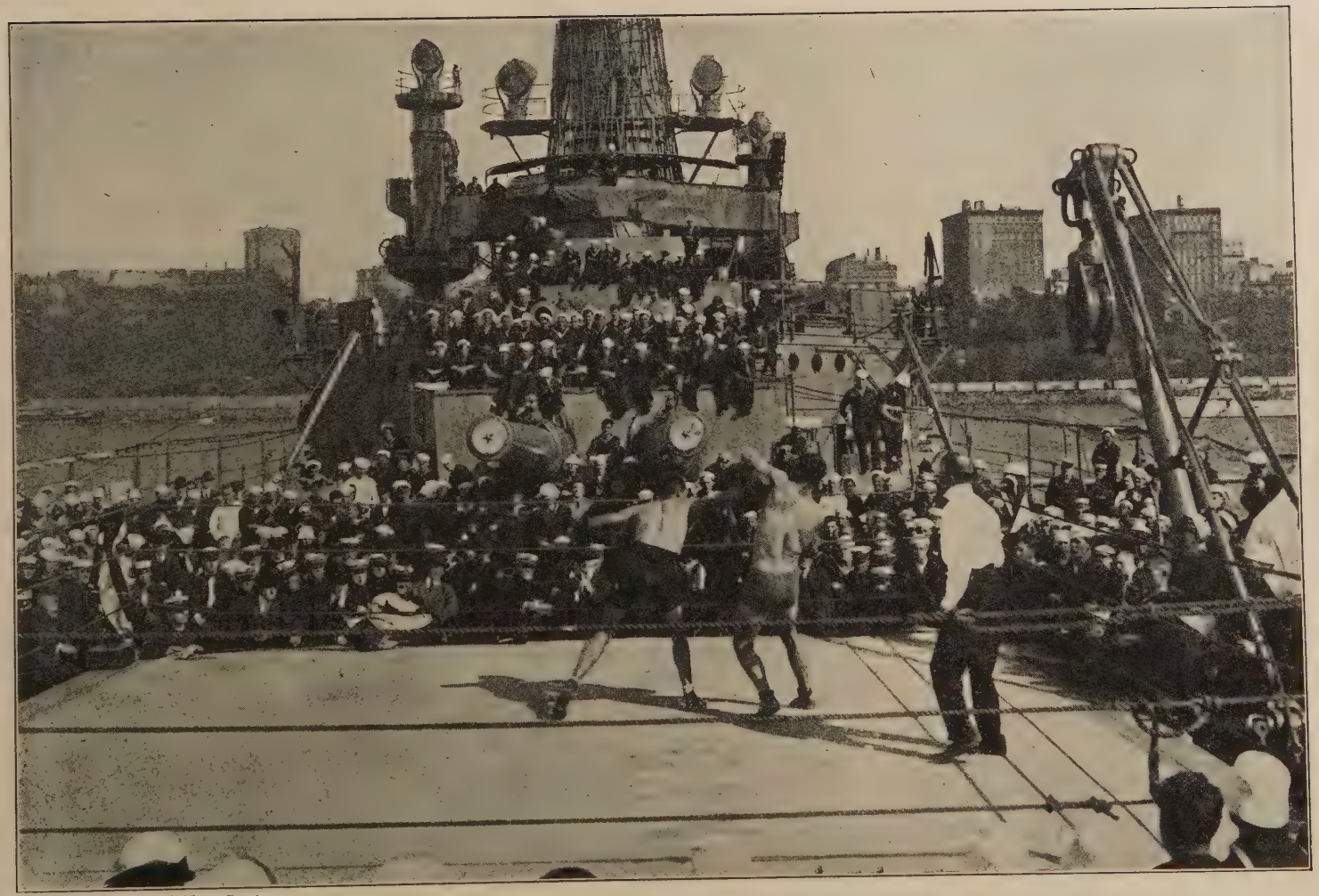


Photo by International News Service

A CHAMPIONSHIP BOUT

Courtesy of "Our Navy"

A TUG-OF-WAR AT VERA CRUZ

Courtesy of "Fleet Review"

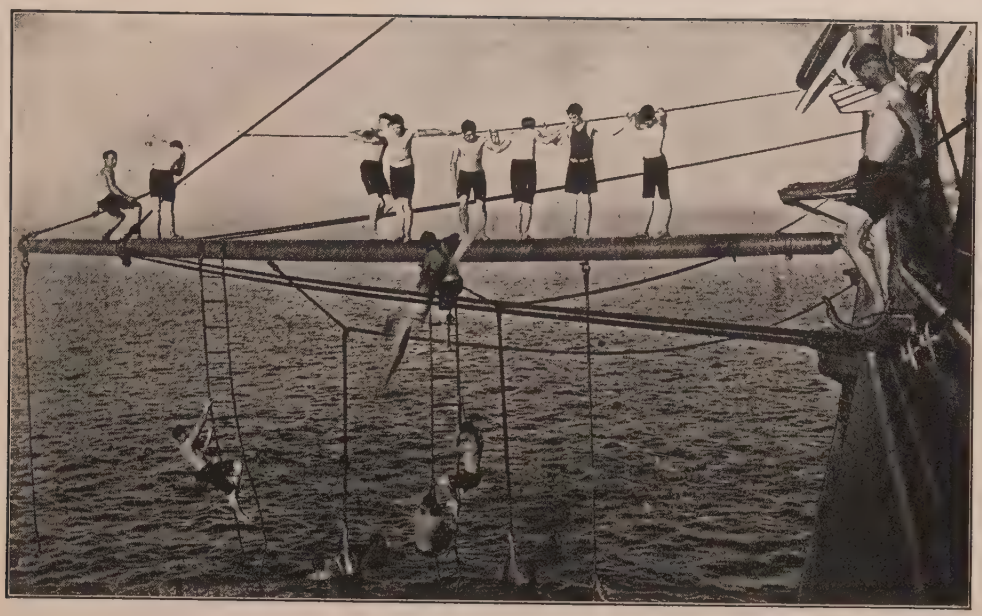
BASEBALL AT GUANTANAMO WITH SMALL ARM TARGET-BUTTS IN BACKGROUND

the colleges. It is used only for races, scorning the heavy work of the regular cutters, and is built to give its picked crew a boat both light and fast and yet staunch enough for rough and choppy seas. It is manned by twelve men and a coxswain instead of the eight of the 'varsity crew, and the coxswain urges on his huskies standing in the stern sheets and steering with a tiller where his college rival sits and steers with tiller ropes. Officers who have pulled an oar in an Annapolis shell against leading college crews work wonders with the racing cutter and its twelve giants. In the old days rival crews lashed the heavy slice bars of the stokers under a rival's keel, but in racing to-day, as in all other sports, the American tar follows the latest rules, and the Navy's motto is: "May the best man win!"

WRESTLING IN THE NAVY

The Docking and Overhaul Period is the truly nautical name for the midstretch of the year's athletics, coming in the fall when the ships scatter to their home ports and navy-yards. Football and basketball now claim their share of the glory. At each yard the elevens meet in an elimination series and the winners later decide the football championship. Under the captaincy or coaching of an officer who has won the yellow N in the famous West Point-Annapolis games, the teams play a game that would be a credit to the minor college elevens. Gridirons hard as the decks of their battleships have no terror for the sinew and bone bred in the Navy. Tackles that would disable an ordinary football star leave no wrecks in their wake when the final elevens meet.

With the bands playing, the rival yells crashing out at every good play, and the goat, bear, or mule mascots straining at their leashes on the sidelines, no game could be more colorful. The winning eleven leaves the field the heroes of the great Fleet and its ship carries the Navy Department's trophy for a year.



SWIMMING CALL

Courtesy of "Fleet Review"

A BATTLESHIP'S TRACK TEAM

Then the basketball teams have their innings and each man on the championship five wears a gold basketball as a souvenir.

When the Fleet steams South out of the sleet and drizzle of the navy-yards for the blue waters and flying fishes of the Caribbean, it has the racing cutter, baseball, swimming, boxing and wrestling and rifle championships to look forward to. This cruise, known as the Winter Drill Period, lasts three months and is usually based on the naval station at Guantánamo, a few miles eastward from Santiago, Cuba, where the hulks of Cervera's fleet still lie. Its magnificent harbor and great sandy beaches make it an ideal field for the Athletic Week that eclipses that of the summer. When the teams and recreation parties "hit the beach" in this Cuban paradise you may have your choice of a dozen baseball matches, basketball, golf, tennis, trap-shooting, rifle and revolver contests, swimming, rowing and sailing races. The baseball teams play out their schedule, and the crack swimmers cleave the blue of the bay for their gold, silver, and bronze medals. On the forecastles the boxers and wrestlers battle for the gold challenge belts in bouts that fan the rivalry to white heat.

Courtesy of "Fleet Review"

BRITISH-AMERICAN CHALLENGE TROPHY PRESENTED BY ADMIRAL PRINCE LOUIS OF BATTENBURG

The week ends with the racing cutter crews pulling out every ounce of strength for the famous Battenberg Cup. The British tars of the Cruiser Squadron, commanded by Rear-Admiral H. S. H. Prince Louis of Battenberg, presented this cup to the enlisted men of the United States Atlantic Fleet in 1906, "in grateful remembrance of the many kindnesses, tokens of good fellowship, and wonderful entertain-

ments that were given us in cordial friendship by our comrades across the sea,'' after the visit of that Squadron in American waters.

One condition of the gift is that a British ship present at the time the Cup is raced for shall be allowed to compete. Only once has a British crew won this blue ribbon match.

To win the star events of the year's matches is not the prime idea of the Fleet. Greatest of all the trophies, overshadowing the baseball or football championships and the Battenberg race, is the trophy for General Excellence in Athletics. This is awarded to the ship showing the highest score in all events that it was possible to enter, and is a great incentive for all men in the Navy to take up some form of athletics for the honor of the ship. Only the big red pennant with the black ball in the center that the crack gunnery ship flies at masthead ''rates'' this hard-won honor.

WORKING OUT FOR CHAMPIONSHIP BOUTS

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THE GOAT IS THE NAVY'S BEST PET

XXVIII

SAILORMEN AND THEIR PETS

THE love of sailormen for pets is proverbial. Few ships put to sea without one or more pets aboard; and as the man-o'-war's crew is the largest, here we find the greatest and most interesting variety. The life of them within the steel walls of an American warship is an enviable one. They never lack an audience and are in constant danger of being overfed and pampered, from the Captain down to the ship's bugler. The "happy hour" finds a knot of bluejackets and marines always ringed about them, laughing at their comical antics and putting them through tricks that would do credit to the performing animals of a traveling circus. The ship without a pet, or one that has just gone into commission without one on board, is not a happy ship until a bluejacket leads a whiskered goat, a curly-tailed pig, a mischievous monkey, or a frolicsome pup up the gangway.

There is no limit to the range of pets that are the mascots of a fighting ship. Goats of all colors and degrees, dogs of every breed, monkeys from the jungles of tropical lands, inquisitive-nosed raccoons, bright-plumaged parrots, and the always popular bear lead in favor. Yet it would be hard to think of any four-legged beast or any bird that would not find a royal welcome. The ship that can claim an unusual pet is the envy of the Fleet.

Such a pet was Cronje of the cruiser *Atlanta* when she was stationed on the South Atlantic Station. It was at the time of the Boer War, in which General Cronje was a leading Boer general. So, when a Brazilian wild boar, or peccary, was added to the complement

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"SKIPPER" IS THE CHAMPION LONG DISTANCE SLEEPER OF THE FLEET

"PRUNES" THE "CALIFORNIA'S" PRIZE PET

Photo by Paul Thompson, N. Y.

THE "UTAH'S" PRIDE VISITS THE POLO GROUNDS

of the *Atlanta,* he was promptly christened Cronje. Cronje adapted himself to shipboard life as though he had always been a sailor instead of a denizen of a South American jungle.

If by any chance a member of the pig family could be called good-looking, then Cronje was a handsome pig. His nose fairly quivered with the joy of life at sea, his feet were daintily formed, and his coat was sleek from the care it received daily. Cronje loved to poke his nose, which was shaped, of course, somewhat like a pansy, into everything. But most of all he took pleasure in sticking it into a can of the brick-red paste used to clean the brasses on board the cruiser. The crew firmly believed that Cronje had been the beau of his jungle, and thought it was pig rouge.

At other times his savage instincts came to the front, and when he was angry his jaws

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BULL AND BRINDLE

would snap like a steel trap. Then the men, in the language of the sea, "gave him a wide berth." He took a decided dislike to the young bugler, who most likely had annoyed or struck him at some time. Whenever the lad came near, Cronje's jaws would snap with such force that you could hear it plainly all over that part of the ship.

THE PETS OF THE "WYOMING"

Cronje's greatest delight was to fall in with the ship's goat in the rear of the division stationed on the quarterdeck after the morning physical drill for the double time around the deck. They would follow the column, romping like boys just out of school, the goat rising on his hind legs now and then to twist his head and try to butt Cronje. The little fellow would

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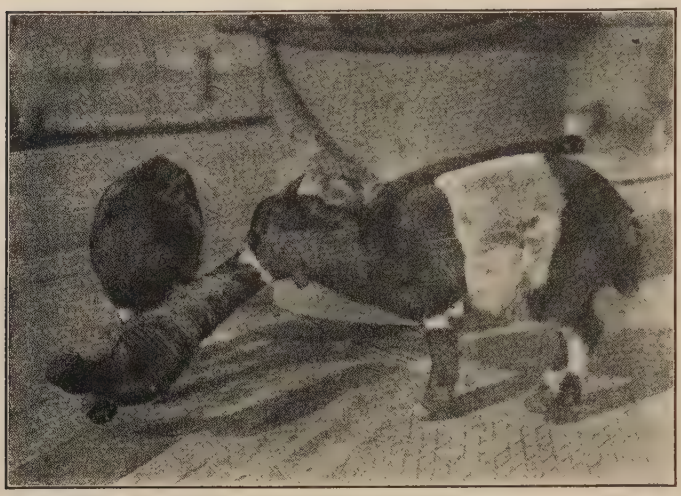
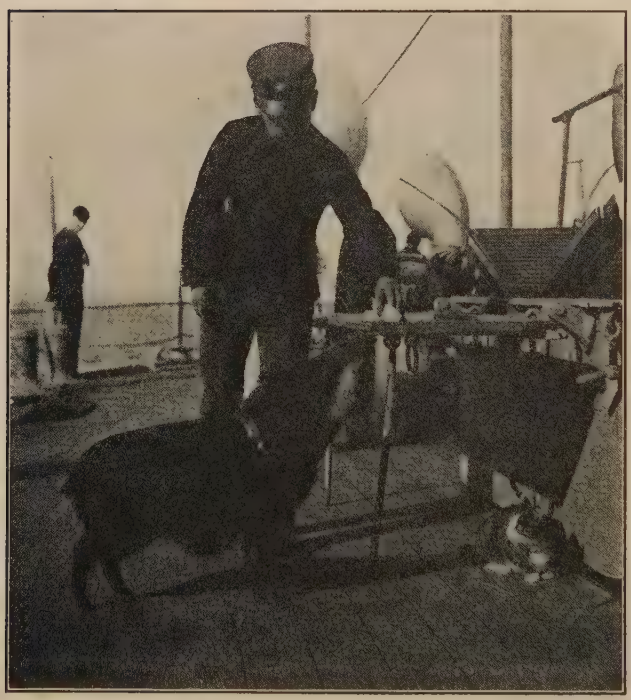
A DREADNOUGHT'S MASCOT



MAKING A MEAL OFF THE PARCELING OF A HAWSER



"CRONJE," THE TAME BOAR OF THE "ATLANTA"

dodge and snap his jaws in play. His dainty feet were not made for teak decks, and in taking the turns he would have to bring all four feet together and slide. The deck was so small that he invariably fetched up in the waterways that run like a gutter around the deck's edge, and then he would stumble and fall in a heap, only the lifelines saving him from going overboard. This was great fun for Cronje as well as for the crew, and, scrambling back to his feet, he would run all the faster. Without warning, he would dash out of the column and charge through the door into the crew's living quarters and straight ahead like a bullet, until something stopped him.

Cronje, after a tour of South America and the West Indies, ended his gay life at the Mardi Gras festival in New Orleans.

There was never a pig aboard ship that was not called Dennis,

and few that did not learn to chew tobacco and drink strong hot coffee. It was an ancient belief among Chinese sailors that the outline of a pig tattooed in blue on the instep was a safe charm against drowning. Sailormen of all nations share this belief more or less, and many carry the little blue pig on the instep of one foot. At all events pigs are in high favor at sea. The crew keeps them immaculately clean and they learn many curious tricks. A famous Dennis made his home on the gunboat *Yorktown* when Fighting Bob Evans, then a Commander, took her around the Horn in 1891. At Bahia, Brazil, black Dennis was reported as missing. It was apparent that he had fallen overboard through one of the ports, to make a tasty meal for a shark, and the gunboat was plunged into mourning. Five days out from Bahia the orderly awakened Commander Evans to report that Dennis had been found. "And who in the name of Neptune is Dennis?" he demanded, for it was two o'clock in the morning. So the

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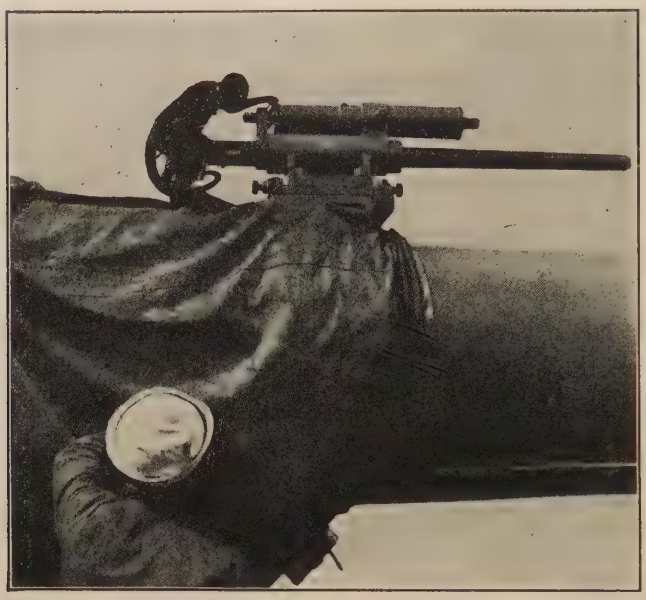
TWO FORECASTLE PETS

THE BABY CAMEL MASCOT OF THE MARINES AT PEKING



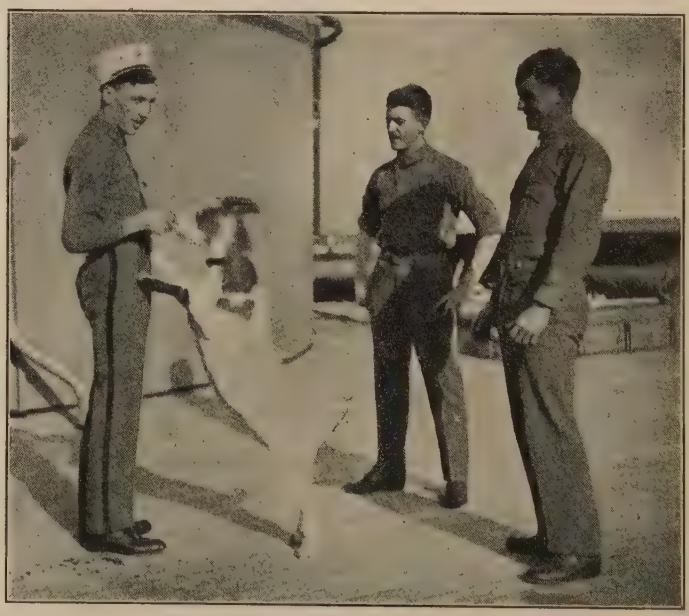
Courtesy of "Fleet Review"

MONKEYING WITH THE GUN

orderly explained that Dennis was the lost pig; that he had been found in a coal bunker and was very weak and ill. The Captain got into uniform and on deck found Dennis in the arms of the ship's cook, drinking condensed milk out of a spoon.

One of the coal passers, going into the bunker to pass out coal for the fires, had heard a faint squeal and something moving. This, in inky darkness, was too much and he had fled for the fireroom, dropping his shovel and shouting that the devil was after him.

They had found Dennis, black as the coal itself, weak and thin and nearly dead. He had fallen into a coal chute while coal was being taken in and there for five days, packed in among it, he had gone without food and drink. Dennis made a complete recovery, only to fall victim to his appetite by eating too many acorns



"BETTY" OF THE "NEVADA" LUNCHES ON CIGARETTE PAPERS

when his shipmates took him ashore one day for a run on the beach.

Dennis fared better than Jock, the monkey who left the island of Trinidad to make his home on the destroyer *Reid*. Like a true monkey, Jock was always up to his ears in mischief. Of all places he liked to apply his talents for mischief in the forbidden quarters of the Captain's cabin. It was useless to tie him up, for there was never a knot that he could not untie. When discovered he would scamper out and up the mast to safety.

Courtesy of "Our Navy"

A SAD OLD DOG OF WAR

One unlucky day Jock upset red and black ink and mucilage on the Captain's desk and then, with his sticky paws, mussed up the Captain's official papers and books and left their marks on the Captain's bunk. The steward spied him at the height of his artistic endeavors and gave chase. Up the foremast flew Jock and then, to taunt the enraged steward, started across from the foremast to the mainmast on the wireless aerial which stretched from one masthead to the other. With the crew watching, Jock showed his best paces until he got over the smokestacks. It was a calm day and the ship at anchor, so the smoke and gases from the stacks were rising straight into the air. When their blast struck into Jock's nostrils he was overcome by the hot gases. Losing his hold, he fell right down into one of the stacks and was cremated. His tragic end cast a gloom over the destroyer's crew, with the exception of the hard-hearted steward, who said it served Jock right.

Sailormen have even been known to try to make a pet of an albatross. It is the worst disaster that a ship can suffer to have one of its crew shoot an albatross, as the Ancient Mariner of Coleridge's Lay has made immortal. But at times albatross, weakened from long flights, will seek refuge aboard a ship at sea. Masters of the air and

making their home at sea, as soon as they light on a ship they become violently "seasick" and can only flounder helplessly about.

Goats are also great pets at sea, for they enter into the life, making friends, parading ashore with the ship's company, and affording never-ending pleasure with their propensity for butting and their queer appetites. Billy, the goat of the monitor *Ozark,* shared pet honors with a dog. Lying in the Panuco River off Tampico, Mexico, the prevalence of malaria, yellow fever, and dengue called for the taking of a five-grain capsule of quinine daily by each man in the crew at breakfast, and Billy was always on hand for his quinine ration. Quinine appealed to Billy until one day he made away with a box of one hundred capsules. The ship's surgeon pulled him back to life and his ration was cut off, for Billy was immune to fever after that breakfast of five hundred grains.

Some ship's goats have records that rank with Billy's best performance, like the marines' goat on the *Nevada* who will eat cigarette papers, standing on his hind legs, as fast as they can be fed to him. But the most famous goat that the marines knew was Spiggotty, who joined the marine battalion in the trenches at Guantánamo in '98. Spiggotty's favorite meal was lighted cigarettes, which he devoured greedily. He came to an untimely end at the New York Navy Yard years later after eating a lot of asbestos and then filling up with water. The combination was too much even for Spiggotty, but unfeeling persons held that he knew his time was near and that he had eaten the asbestos to prepare himself for his future home.

The dogs who are attached to ships usually are true to one officer or man, but mingle freely with officers and men alike. Sailor, the big mastiff of the gunboat *Nashville,* was an exception. He joined her off the Seychelle Islands in the Indian Ocean, swimming up to the port gangway. Sailor would have nothing to do with any of the officers who tried to make friends with him, and kept forward with the crew, a great favorite. Running through the Suez he seemed to go frantic at sight of the land and ran up and down deck like a wild dog, his eyes always on the shores. At Palermo, Sicily, the *Nashville* was moored offshore. Each night Sailor would leap overboard and swim ashore, coming back the next morning in the market boat. The sight of the brown bear on the *Chicago,* lying nearby, shared the fascination of the shore with Sailor. He would watch Bruin by the hour as the cub lumbered along the *Chicago's* deck, now and then bracing his fore-paws against the barrel of a five-inch gun and swinging his head in comical fashion from one side to the other of the gun embrasure.

It was the same in every port for Sailor; a blur of brown would shoot down the gangway and jump into the first boat that came alongside, barking his joy. At Havana, after he had been transferred to the *Dixie* with his master, Sailor went mad as the *Dixie* passed through the narrow entrance. He had to be held back by main force when the carpenter's gang began to lower the gangway. In Havana he dragged himself back aboard ship after three days' of "rough liberty," but on his next visit ashore Sailor elected to stay ashore and measure his strength against the dogs of the Cuban capital.

When the *Dixie,* on the same cruise, left the Canary Islands, she took with her a black Spanish pointer, Negra, a gray African parrot and a "putty nose" monkey, General. All three were fast friends. The gray African parrots are better talkers than the more showy Brazilian birds, and Polly ended her days in a navy-yard, swearing at the house cat in two languages.

The General was passionately fond of eggs, and when a joker passed one, just out of hot water, to him he would roll it up and down the deck with his paws, with little cries and capers, until it was cool. Then he would crack one end with his teeth and drain it. Raw eggs saved his life after he had found and devoured a sup-

Courtesy of "Our Navy"

"PETE" IS TRUE TO THE DESTROYER FLEET

Courtesy of "Our Navy"

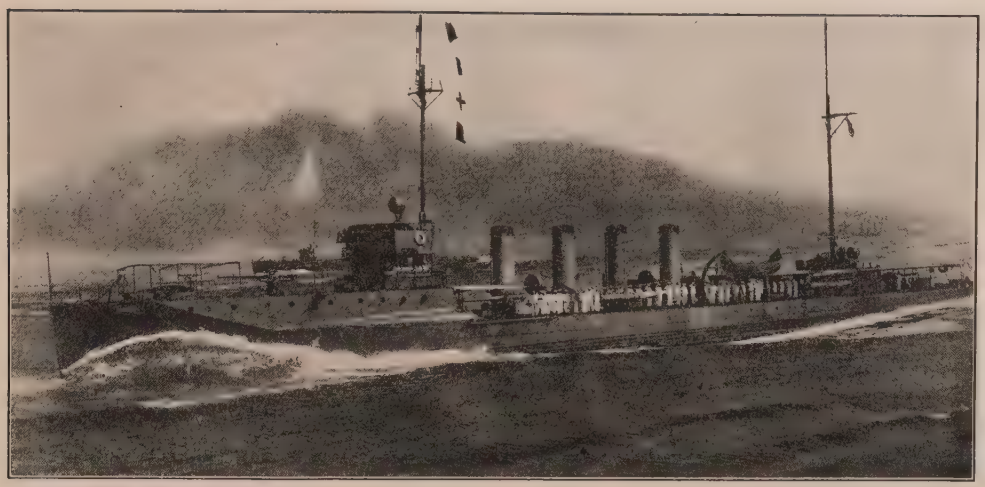
"BLACK JACK" OF THE "FLORIDA"

ply of vaccine points, pills, and powders in the surgeon's room. When the ship came back into cold waters the ship's tailor fashioned an overcoat for him out of an old marine's blouse, using the red piping to ornamental effect, but three days after the *Dixie* made New York he succumbed to pneumonia.

The baby eagle mascot of the marines at Peking, China, is known throughout the Far East for his prowess as a Yankee fighter. A Chinese fighting cock had finished off every feathered opponent in the cockmains until the eagle was matched against him, his feathers trimmed until he looked like a strange variety of rooster. The Chinese champion attacked him with bill and spurs, tearing out feathers, but the eagle, with eyes closed, made no reply and looked to the anxious and discomfited marines like a beaten bird. The Chinese fighter swooped in to deliver the finishing blow. Suddenly the eagle awoke, stretched out his talons, and caught the champion firmly about the neck. With one twist he tore its head off, and the Chinese spectators fled in dismay, to spread the news through China of the wonderful American rooster.

It is a happy life the pets live in the Fleet. Cats and dogs seem to forget their traditional enmities. Goats and monkeys pose together for their photographs; and parrots, on their perches, talk in true deep-sea language to the bear cubs and pigs as they roll by on the sea legs that long cruises have given them. And in the background the happy grins of the crew greet every amusing gambol of their ship's mascots.

NURSE AND MASCOT



Courtesy of "Fleet Review"

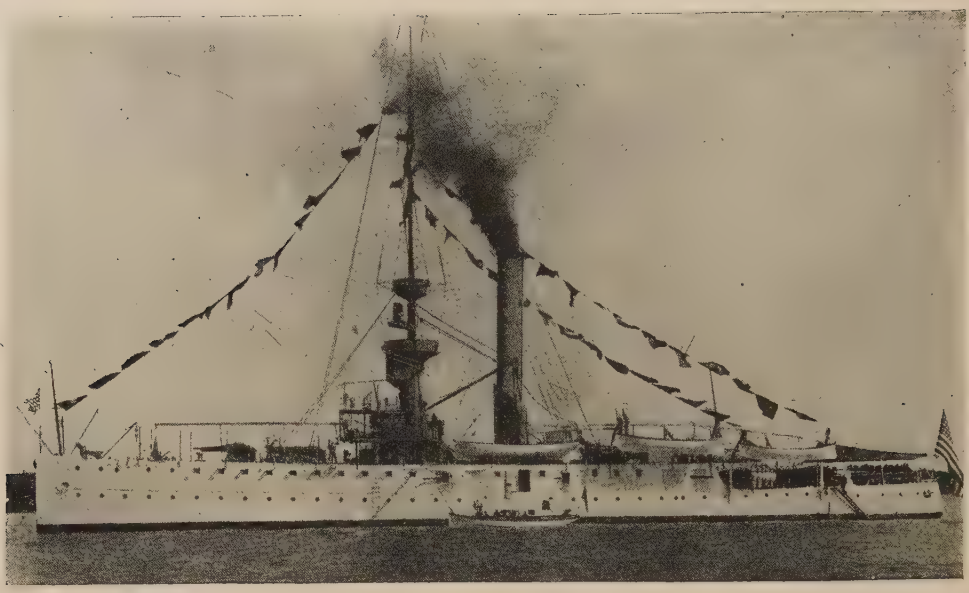
THE DESTROYERS PASS IN REVIEW

XXIX

CEREMONIES AND UNIFORMS

EXCEPT for the ceremony that surrounds the court of a foreign ruler there is no other spot where there is so much picturesque and interesting display of ceremony as on the decks of a man-o'-war. All sailormen, whether they are on fighting ships, merchantmen, ocean greyhounds or private yachts, are sticklers for form and custom. The man-o'-war dictates the general form and the others follow with less detail, except for the yachtsman; so that, in describing the ceremonies of the American Navy, a picture of the ways of the sea in etiquette and polite interchange of courtesies may be shown.

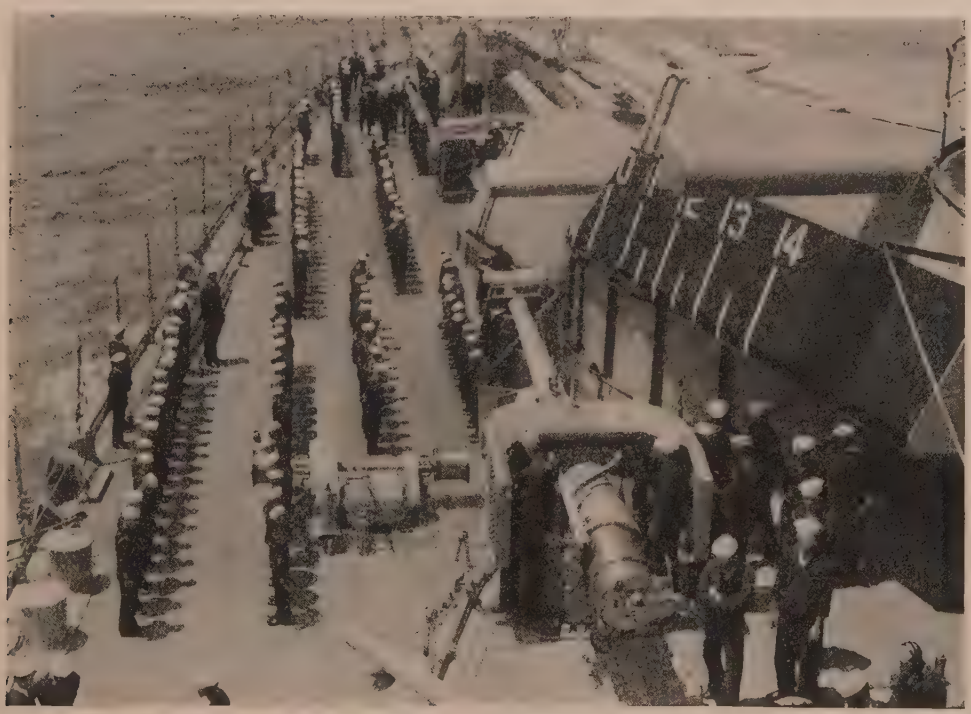
To an outsider the length to which the details of the ceremonies are laid down in the regulations of the Navy may seem too elaborate. He looks upon it, in the language of the Navy, as "red tape." There are good reasons for the display, however; for at the base of them all is the show of respect for the nation's ruler, the tribute to rank, and the idea of courtesy. These outward forms are an aid to discipline and to the spread of patriotism. No officer or man of the Navy ever fails in his respect to authority or allows the national colors to be carried past in parade without doing honor to them. It would be



THE GUNBOAT "HELENA" DRESSES SHIP ON ASIATIC STATION

THE ADMIRAL TURNS OVER COMMAND OF THE FLEET

READY TO RECEIVE THE PRESIDENT



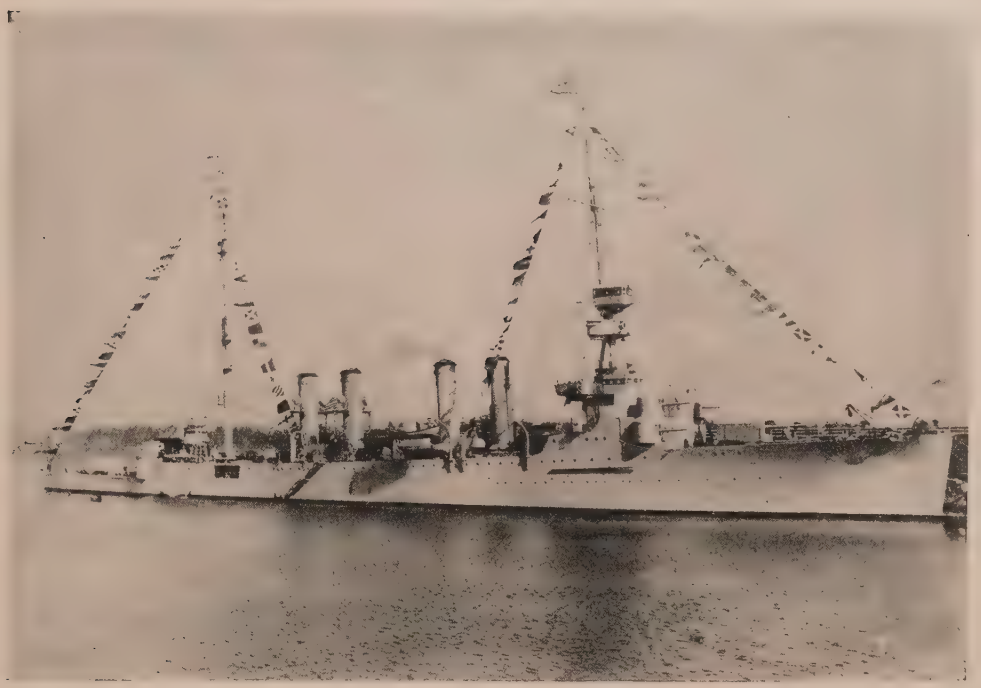
INSPECTION OF DREADNOUGHT'S CREW

the height of discourtesy in the Fleet to interrupt the talk of another ship, for instance, while she is making a flag-hoist signal, just as in private life it would be impolite to interrupt a conversation. The strict routine of a warship becomes less monotonous; for the ceremonies that surround a visit to a foreign port, the passing of a warship at sea, the transfer of an Admiral's flag, the presentation of a silver service by the State whose name the ship bears, the commissioning of a new ship, the review of the Fleet by the President or the Secretary of the Navy, and the passing of Washington's Tomb on the Potomac—all are made the occasions of colorful incidents.

Greatest of all the ceremonies on board an American man-o'-war is the visit of the President of the United States. When the *Mayflower* steams between the lines of gray fighting machines with the blue flag of the President at her main truck, and beneath the rainbow of colors that loop from stem to stern of every grim ship the guns boom their salute of twenty-one guns, there is no other sight on the face of the waters that can compare with it for picturesqueness and dignity.

The President decides to visit the Commander-in-Chief on his flagship. She has, in anticipation of his coming, been full-dressed with a rainbow of flags reaching from the waterline forward, over the mastheads, to the waterline aft. As the President's launch comes alongside the ladder, the shrill notes of the bosun's pipe stir the senses of the flagship's officers and crew who have been on the alert for him to appear. Forward on the jackstaff is the Union Jack, with its white stars on the blue field. At masthead flies the largest national ensign the ship owns. The officers have assembled in special full dress, with cocked hats, epaulets, and swords, on the quarter deck, and near them is paraded the detachment of marines in full dress.

The Admiral with his staff, the Captain and other officers, receive the President as he steps on deck, and as he passes through the double line of eight side-boys the silent ship bristles with life. The officers salute and the marine guard presents arms, while the drummer and bugler of the guard salute with four ruffles and flourishes. At the last note of the bugle and roll of the drum the flagship band strikes into *The Star-Spangled Banner,* and the blue flag of the President, with the coat of arms in the center, is broken out at the main to fly while he is on board. Immediately, as the flag whips out to the breeze, the national salute of twenty-one guns comes, fired by two saluting guns with an interval of five seconds ticking off between each gunfire. The other ships present man their rails and fire the national salute with the flagship.



THE "OMAHA" CELEBRATES THE FOURTH OF JULY

When the President leaves the flagship the same ceremonies are repeated, the salute being fired when his launch has cleared the ship to a safe point, and with the last gun the President's flag is lowered.

And so, with a corresponding degree of honor the visits of foreign rulers, of naval, military, diplomatic, and consular officers, is observed, ranging down from the twenty-one guns and eight side-boys of the ruler to the five guns for a Vice-Consul, and to the simple honor of two side-boys for officers of junior rank.

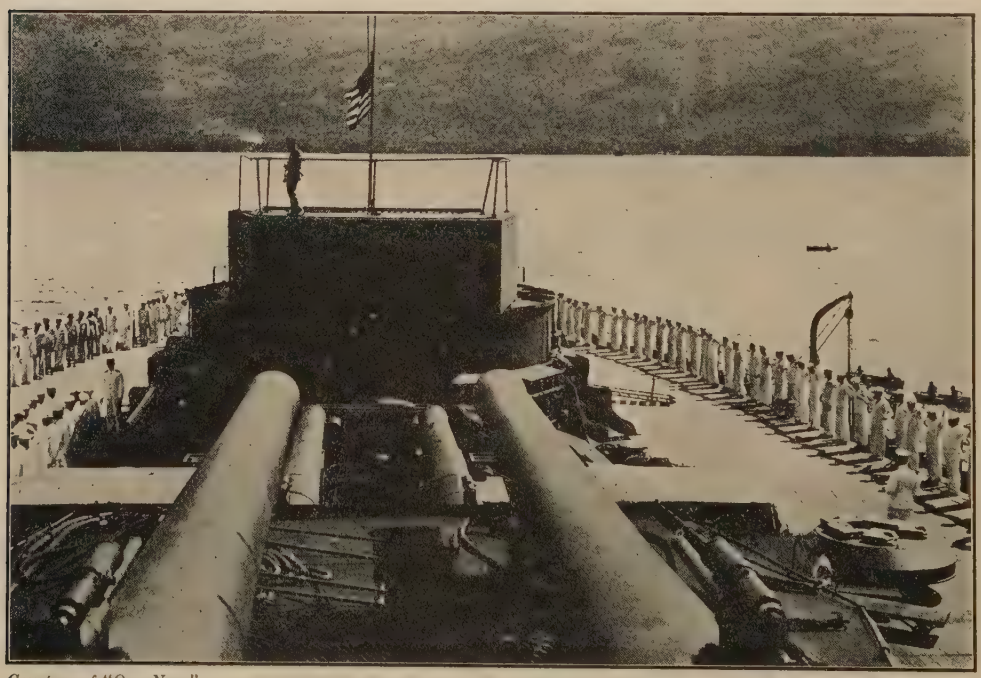
There is a pretty bit of sentiment shown when the Admiral turns over his command to a successor. Then commissioned officers form the line of eight side-boys and another "pipes the side" as he leaves the ship, to be pulled away in a barge manned by officers.

One of the finest of all tributes paid by the American Navy is in its honor to the memory of George Washington. No naval ship passing his Tomb at Mount Vernon on the Potomac between sunrise and sunset fails in this fine bit of sentiment. As the ship draws near it parades its guard and band on the quarterdeck, the ship's bell

is tolled, and its colors half-masted. Opposite the tomb taps are sounded, the marines present arms, and officers and crew, stiff at attention, salute in respect to the memory of our first Commander-in-Chief.

Every day the Navy salutes the national colors, both at "morning colors" at eight o'clock, and at "retreat" at sundown. As the flag climbs smartly up the hoist the band plays *The Star-Spangled Banner*. All officers and men face the colors at attention, and at the last note of the anthem salute with the hand. At sunset "colors" the ensign is started slowly from the peak or truck at the first note of the national air. It was once the custom to play *The Star-Spangled Banner* at "morning colors" and *Hail Columbia* at "retreat," but an order of the President's made *The Star-Spangled Banner* the official anthem.

The visit of an American warship to a foreign port begins with the thunder of her salute to the country's ensign that is seen either flying from a fort on shore or from a man-o'-war lying in the harbor. At the main is shown the flag of the foreign country, and there it flies until the last of the twenty-one guns has been fired. Then come the visits of courtesy, which must be returned within twenty-four



Courtesy of "Our Navy"

MANNING THE RAIL IN A FOREIGN PORT

hours; and if foreign men-o'-war are at anchor a boarding party of commissioned officers leaves the ship to pay less informal calls.

At times honors have not been properly paid, or promptly returned, and relations are strained until the incident is cleared up; for carelessness in this deepsea etiquette is a slight to the flag of a country rather than to any individual or ship.

When ships of different countries pass at sea they exchange the salute, gun for gun, showing the flag saluted at the fore. If the ships pass close by the national airs are played by the bands. No naval ship lowers her sails or dips her colors except in return for such compliment. In parading on shore the Navy dips the national ensign only when passing in review before the President or the ruler of a foreign nation. No American warship salutes any American city or fort. At night, when the ships are bare of bunting, strings of electric lights silhouette her from stern to stern, and from deck to masthead, and the searchlights play on the waters.

On holidays the Fleet, when not under way, is as gayly decked with bunting as any city's streets. Full dress, the Navy calls it, and at eight o'clock the rainbows of flags break out and are not lowered until the sun sets. On Washington's Birthday and the Fourth of July the national salute is fired at noon, and on Decoration Day minute guns are used. All unnecessary drills and work are suspended for the day and the holiday is fittingly celebrated. At sea when the salute is fired the national ensign is displayed at the peak.

An impressive ceremony always is that of a burial at sea. The ship is hove to and the ensign half-masted while the chaplain or the captain of the ship reads the burial service. The foot of the body's canvas covering is weighted with a round shot and the body is covered with an American flag and with flowers. As it is committed to the deep a bugler sounds "taps" and a squad of marines fires three volleys as the last mark of respect. If the funeral should be held on shore the escort of marines and bluejackets march to the solemn dirge of the *Dead March* from Saul or Chopin's *Funeral March,* but when "taps" has sounded they swing back to their ship to the tune of a lively quickstep.

The Union Jack, which is flown from the jackstaff in the bow of a vessel from morning to evening colors, is sometimes hoisted at the fore as the signal for a pilot, and a gun fired to call attention to it. When it is hoisted at the mizzen or at a yard-arm, and a gun barks, you may know that a court-martial or a court of inquiry is in session.

Naturally the greater the rank of the naval officer in command

the more ceremonious is the routine of a ship, squadron, division, or fleet. The flag carried at masthead of a ship shows his rank. The Admiral flies a blue flag with four stars of white. The Vice-Admiral's and Rear-Admiral's flags are blue with three stars for the former and two for the latter. When two or more flag officers of the same rank are present the senior flies his blue flag while the others hoist a red flag.

All steamers, whether liners or cargo carriers, fly the flag of the nation to which they belong. Besides this they also display the distinguishing or "house flag" of the line, and each line has its funnels painted with distinguishing marks, so that other ships, and the observers who report incoming ships to the port officials, may know them. Great Britain, Germany, and other naval powers have a man-o'-war flag and a merchant flag that are quite different. The United States and France are among those that have but one flag for men-o'-war and merchant vessels. The American yachting ensign, however, is different, for its thirteen stars are grouped in a circle about a fouled anchor.

Courtesy of "Our Navy"

WHEN A SHIP COMES HOME FROM A FOREIGN STATION SHE FLIES A HOMEWARD BOUND PENNANT

The ceremony of announcing the time aboard ship by the strokes of a bell is an ancient one. A stroke is made on the bell for every half-hour and the number of strokes indicates the time. Beginning at noon, for instance, eight strokes are made in four pairs of strokes. Noon is eight bells at sea. At 12:30 o'clock there is one bell. At 1:30 o'clock, or three bells, two strokes are given and then, after a slight pause, a third bell. So it goes until eight bells come again at 4 o'clock.

From four to six and from six to eight are the first and second dog watches. All other watches are for four hours. A mutiny was planned in the British Navy at Spithead in the Nore, in 1797, to take place at seven bells of the second dog watch. The officers, hearing

of the plot, had no bell struck at that time; and the signal failing, the mutiny also failed. The custom still holds good in that service only, because of this curious fact.

The officers of the Navy are divided into the line and the staff. Their various titles in order of rank, with the corresponding rank of the Army and Marine Corps are:

NAVY	ARMY AND MARINE CORPS
Admiral	General
Vice-Admiral	Lieutenant-General
Rear-Admiral	Major-General
Commodore (title now only existing on retired list)	
Captain	Colonel
Commander	Lieutenant-Colonel
Lieutenant-Commander	Major
Lieutenant	Captain
Lieutenant (junior grade)	First Lieutenant
Ensign	Second Lieutenant
Midshipman	

Courtesy of "Fleet Review"

A BURIAL AT SEA

THE "UTAH'S" FIGHTING MEN MAN THE RAIL

FIELD MARSHAL JOFFRE AND FORMER PREMIER VIVIANI RECEIVED WITH FULL HONORS ON THE FLAGSHIP "PENNSYLVANIA"

Chief boatswains, chief gunners, chief machinists, boatswains, gunners, and machinists are warrant officers of the line.

The staff officers of the Navy are surgeons, paymasters, chaplains, professors of mathematics, naval constructors, civil engineers, chief carpenters, pharmacists, chief pay clerks, and pay clerks.

The enlisted man has a title, or rate, which tells the work he does. For example there are seamen, machinists, electricians, hospital nurses, quartermasters, and signalmen. Most curious of all the ratings is that of the Jack-of-the-Dust who is a storekeeper for the Paymaster. The Navy's love for picturesque titles is clearly shown when the enlisted man in charge of a horse at a shore station is known as Coxswain-of-the-Horse.

TWO AMERICAN ADMIRALS

Petty officers of the Navy are similar to noncommissioned officers in the Army and Marine Corps. In the Navy, instead of being called sergeants and corporals, they are designated as chief petty officers and petty officers, such as chief boatswain's mate or boatswain's mate, first class.

All persons in the Navy are required to wear uniforms while on ship. There are uniforms for ceremonies, and for ordinary work; and distinctive marks and uniforms indicate rank or ratings. Officers have stripes of gold lace on their sleeves to show their rank, the number and width of the stripes increasing with the rank. A Captain is unofficially known to the Fleet as a "four-striper" and an ensign as a "one-striper."

THE CHURCH FLAG FLIES ABOVE THE STARS AND STRIPES

The corps device is a star on the sleeve above the stripes for officers of the line, and colored cloth between the gold stripes for officers of the staff. For example, white cloth for paymasters, dark red for surgeons, violet for naval constructors, blue for civil engineers, etc. All officers also wear special uniform devices which indicate rank and crops. The corps devices are stars for the line and oak-leaves of different forms for officers of the staff. Rank is shown by sleeve stripes and by devices on epaulets and by certain shoulder marks by the following system, as follows: one bar for Lieutenant (junior grade), two bars for a Lieutenant, eagle for Captain, two stars for Rear-Admiral, three stars for a Vice-Admiral and four stars for an Admiral.

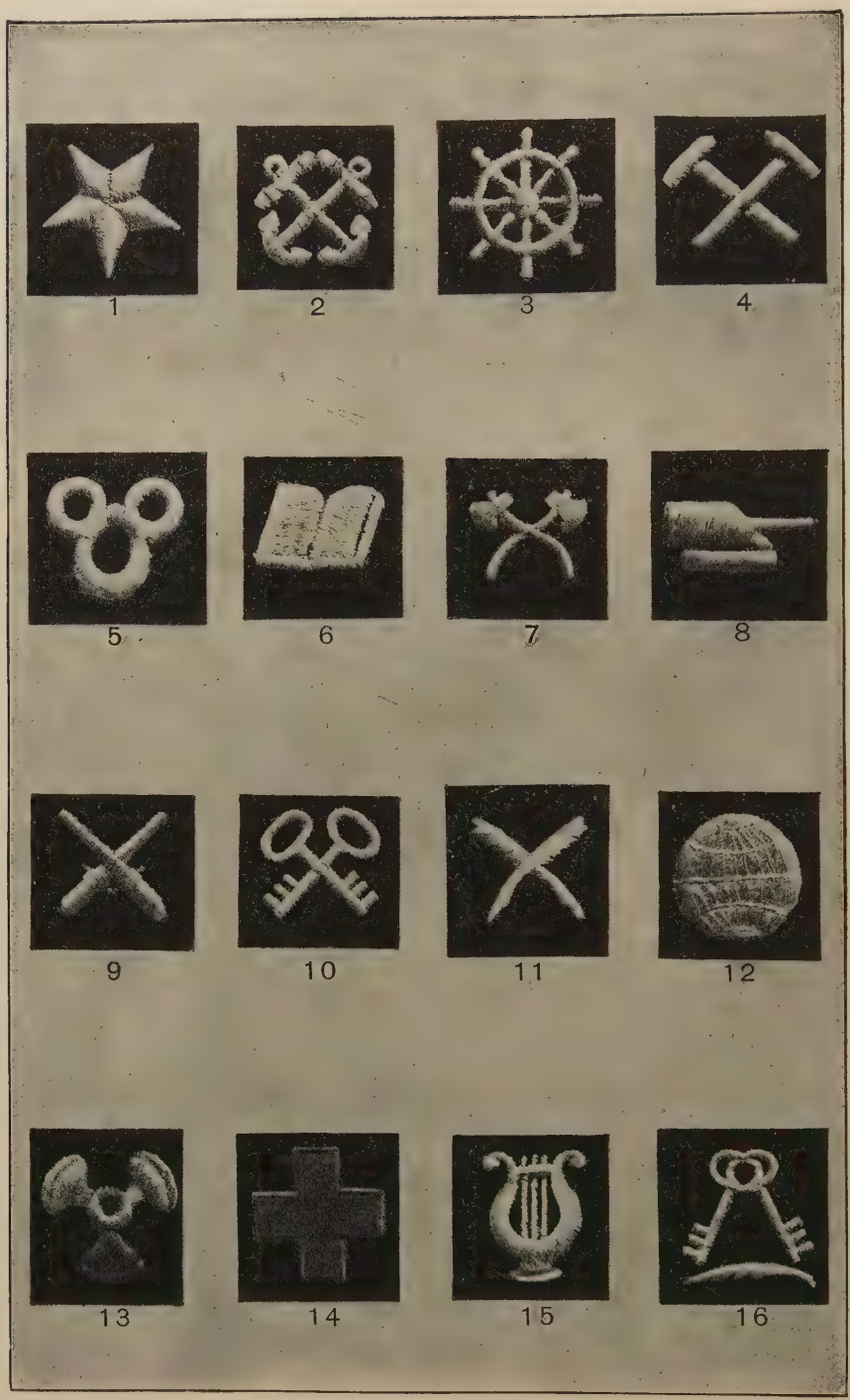
All officers wear a sword at ceremonies and when on military duty, except in action, when they carry an automatic pistol. Commissioned officers wear epaulets and chapeaux on special occasions.

The enlisted men have the blue and white uniform and the flat sailor's cap with the name of the ship on the cap ribbon. Chief petty officers wear a double-breasted sack coat with brass buttons and a cap.

Rating badges and distinguishing marks made of cloth indicate the rating of the petty officers. The rating marks have certain specialty marks which are for the purpose of showing their special trade or line of work. There are a large number of these special marks, the number of chevrons indicating the rating. For example, a second-class boatswain's mate has two and a first-class boatswain's mate three chevrons.

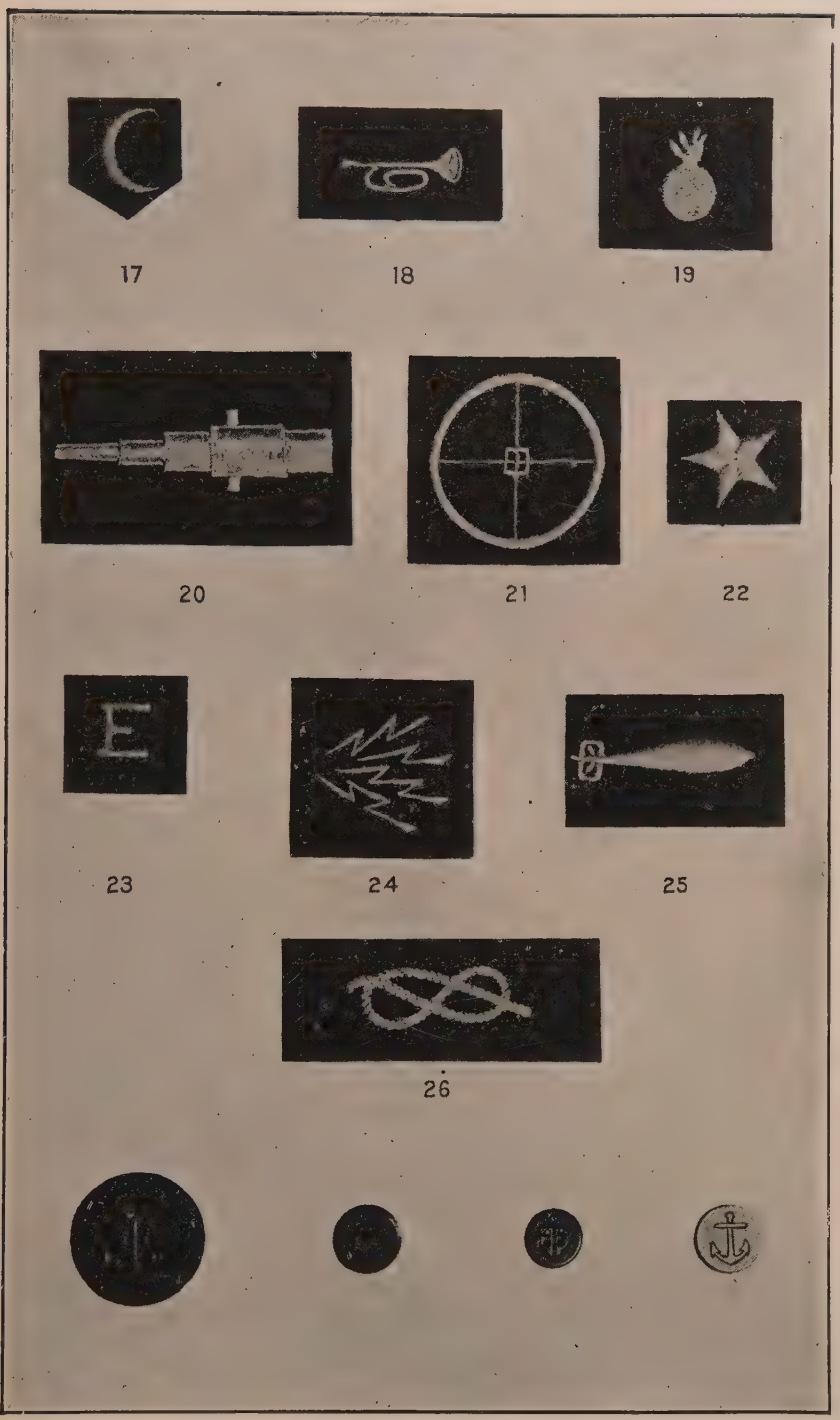
The three narrow white stripes on the wide collar were first worn by the British Navy, one each in honor of Nelson's great sea victories. All sailormen now wear them. The black neckerchief is

INSIGNIA OF RANK ON SLEEVE



THE SPECIALTY MARKS SHOW THE NATURE OF DUTY

1. Master at Arms
2. Boatswains' Mates, Coxswains
3. Quartermasters
4. Blacksmiths, Ship Fitters
5. Sailmakers' Mates
6. Printers
7. Carpenters' Mates, Plumbers and Fitters, Painters
8. Turret Captains
9. Gunners' Mates
10. Storekeepers (Chief Yeomen)
11. Yeomen
12. Electricians
13. Machinists' Mates, Boiler Makers, Water Tenders, Coppersmiths, Oilers
14. Hospital Stewards, Hospital Apprentices (red cloth)
15. Bandmasters, Musicians
16. Commissary Stewards



SPECIALTY MARKS, CONTINUED—DISTINGUISHING MARKS—BUTTONS

17. Ship Cooks and Bakers
18. Bugler
19. Seaman Gunner
20. Gun Captain
21. Gun Pointer
22. Gun Pointer (First Class)
23. Marksmen (Merit Mark)
24. Radio Operator
25. Torpedo Man
26. Ex Apprentice

METAL CORPS DEVICES

1. Line of the Navy
2. Medical Corps
3. Paymaster Corps
4. Chaplain
5. Prof. of Mathematics
6. Naval Constructor
7. Civil Engineer
7½. Dental Corps
8. Chief Boatswain
9. Chief Gunner
10. Chief Machinist
11. Chief Carpenter
12. Chief Sailmaker
13. Chief Pharmacist
14. Mates

supposed to have been first worn as a badge of mourning for Nelson.

You doubtless have wondered at the wide, flapping bottoms of a man-o'-war's-man's trousers. They are made wide so that they can be rolled above the knees when decks are being washed down with water, and when on boating expeditions.

Our ceremonies are fixed by law, but with the growth of the Navy its old traditions die and new customs take the place of old ones. John Paul Jones not only would feel sadly out of place on a superdreadnought but he would be lost in wonder at the passing of old customs. One of the last customs that passed from the decks of the modern navy was the "shooting of Charlie Noble." The chimney or galley-stack of the ship's kitchen was dignified by the name of Charlie Noble, and when the galley-stack became clogged with soot the ship's cook fired a blank cartridge up it, loosening the soot. The report of the pistol was the signal for a shout of glee from the crew. The innocent landsman was informed that Charlie Noble had been burdened with so many troubles that he had shot himself as the only remedy. But Charlie Noble has been shot for the last time.

Note—In addition to the corps devices on the collar, illustrated on the opposite page, the rank is designated as follows:

Admiral—Four silver stars and gold anchor
Vice-Admiral—Three silver stars
Rear-Admiral—Two silver stars
Commodore—One silver star
Captain—Eagle
Commander—Silver leaf
Lieutenant-Commander—Gold leaf
Lieutenant—Two vertical bars
Junior Lieutenant—One vertical bar

These devices are on the collar of service coats and on the epaulettes with dress coats.

Naval Aviation

NAVAL AVIATION CORPS INSIGNIA

The Naval Aviation Corps insignia consist of a vertical foul anchor surcharged with a shield of the United States with eagle's wings extending to the right and left of it as shown in the above illustration. These insignia are made of gilt metal and are worn upon the left breast by all Aviators in the Naval Service, that is, by all officers and enlisted men of the Navy and Marine Corps who have qualified as Aviators and are detailed to duty with the Naval Aviation Corps.

THE "BROOKLYN" ENTERS DRY DOCK

XXX

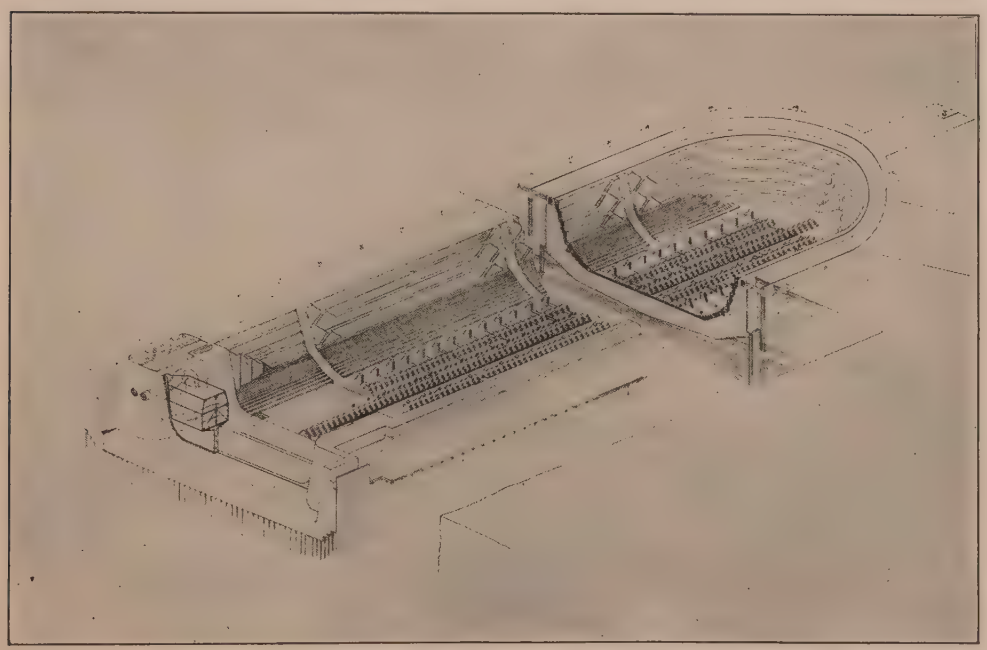
WHERE THE SHIPS NEST

CRUISING about and at anchor, especially so in the warm waters of the tropics, ships gather barnacles and other growths of the sea on their underwater bodies. Then, in the language of the sea, a ship's bottom is foul and she must go back to her nest at the navy-yard to be scraped and cleaned. This fouling reduces a vessel's speed to a surprising degree, and no ship can afford to be left behind in the race. The difference of a few knots would spell disaster in battle to the ship of war, or the loss of money to a liner and merchantman. More coal must be burned to drive a foul hull through the water at a normal rate; and so, in spite of the time lost in overhaul, and the expense of docking, it is well worth while that a ship should be docked frequently. In the Navy the men-o'-war are docked at least once a year, and usually twice in that period.

The docking of a big ship is very interesting, for then she is out of her natural element, the water, and seems to take on an entirely different personality. Stand alongside a dry dock and you will wonder how it is to be flooded and receive its mistress in the great empty nest. Across one end the water outside is barred by a caisson, which has the form of a ship, with its pointed ends, and which, when emptied of the water that holds it fast in place across the dock's end, floats like a ship. Near the bottom of the caisson are circular holes that are barred from the entrance of water by valves, and, when the valves are opened, allow the water to stream in and flood the dock by steady degrees.

When the turn of our barnacle-studded ship comes to enter its nest, the tons of water in the caisson are pumped overboard and the clumsy affair is towed out of the way to let the tugs point our craft to the entrance of the dry dock, where the water is now on a level with that outside its walls. A line is run from the ship to the head of the dock and she is hauled slowly in. Back comes the caisson, its valves are opened, and it sinks to rest across the entrance to the dock.

Before the dock is emptied and the ship rests safely within it, the Naval Constructor who is in charge of the dry dock has consulted her docking plans. Each ship carries a docking plan that answers her needs alone. It would not be possible, for instance, to dock the 27,000-



HOW A DRY DOCK IS BUILT

GENERAL VIEWS OF A NAVY YARD DRY DOCK

ton *New York* and the 20,000-ton *North Dakota* with the same set of plans. When the ship is ready for its turn at the dock its docking plans are turned over to the Naval Constructor, giving him all information about the shape and size of her underwater hull, her bilge keels, and the rudder and propellers at the stern. Armed with this, and the knowledge of her draft, he places a line of wooden blocks down the center-line of the dock's floor, which may be of stone, cement, or wood. He regulates the distance between blocks by the weight of the bulk that is to rest upon them. If a ship of the larger classes she has her docking keels, running parallel to the true keel, and these must be placed on a double line of keel blocks. That the operation is one that calls for the utmost skill and experience is very evident.

Photo by Paul Thompson, N. Y.

THE DIVER IS CALLED ON WHEN A DOCK IS NOT HANDY

With the caisson back in place the pumps which empty the dock are started and all care is taken to get the ship in exact position. When ships have no docking keels, spar-like timbers called "shores" are brought into play, one end resting against the steel sides of the ship and the other against the side of the dock. As the water seeks lower levels the ship's keel touches the line of keel blocks and then the shores are set up tightly by wedges inserted at the proper time to support her. The dock is finally drained as dry as a bone, and with keel aligned along the keel blocks the ship is as firm as a rock, resting on her cradle of wood.

CLEANING HER SIDES AND PROPELLERS

Now is the time to study a big sea-fighter, a blue ribbon yacht, or a mammoth liner. The lines that the sea hides jealously at all other times are now stripped of their mystery. If it is a battleship you can trace the armor belt at her waterline; if a yacht you can see the graceful taper of stem and stern to the huge fin keel that holds her up in a stiff blow; and if an ocean liner the huge rudder and the propellers that drive her through the sea are clear to your view.

First the hull is carefully cleaned and examined for traces of fouling, corrosion, or injuries of any kind. The rudder, propellers, and valves go through the same search. Giant cranes have swung gangways between the decks and the dock's sides, and the decks swarm with workmen and the air is vibrant with drills and hammers. Side-cleaners are swung overside and the underwater body is given coats of anti-corrosive and anti-fouling paint, while repairs are going on.

The docking period finished, the water is again admitted through the lower part of the caisson until it is once more level with the water

outside. The ship floats above her wooden cradle, and when the caisson is removed she comes out, spick and span, ready to try her sea-heels once more.

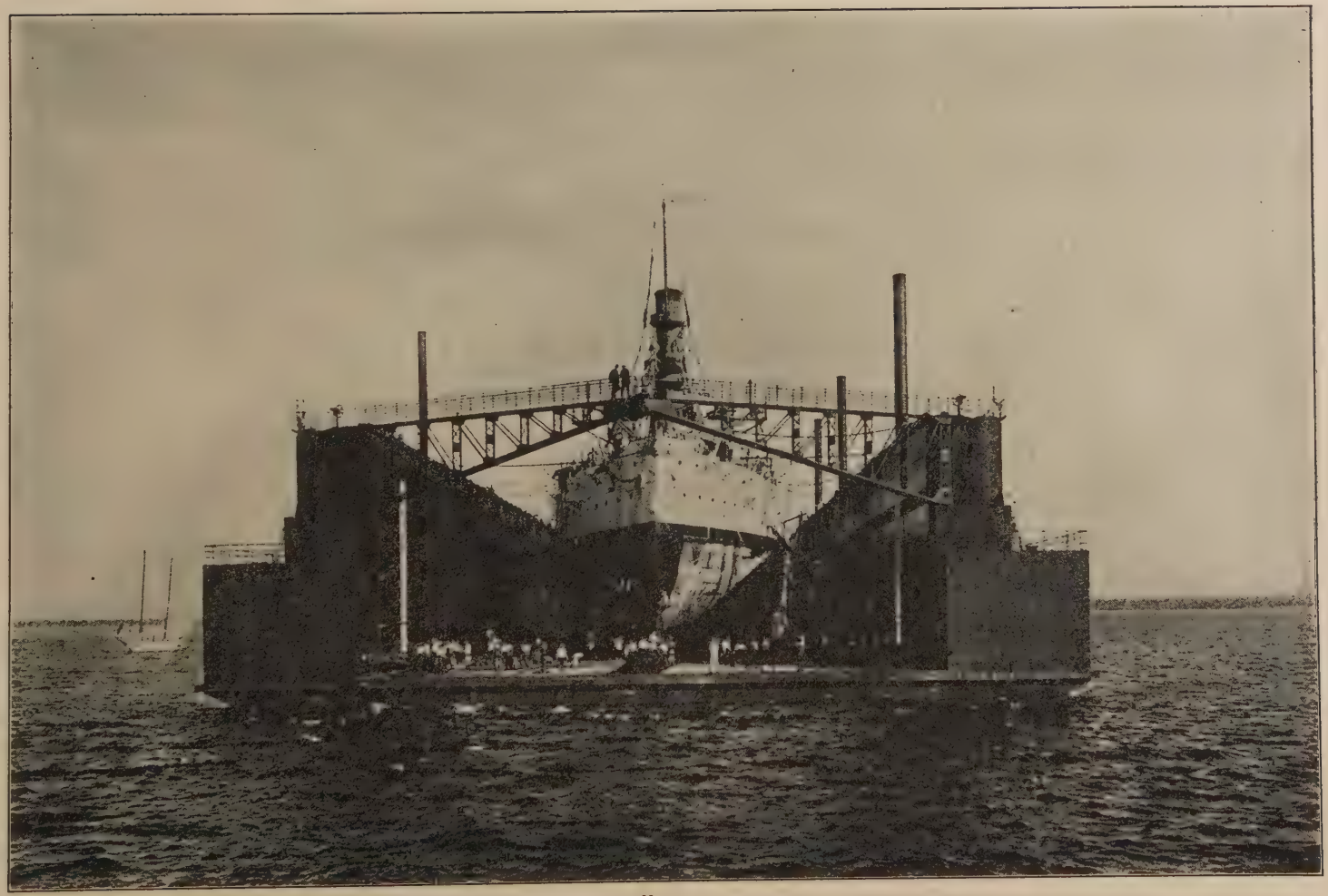
All our navy-yards are equipped with docks, some large enough to handle a superdreadnought, others roomy enough only for a destroyer or a submarine. The shipyards have their docks too, or their marine railways on which smaller craft are hauled out for cleaning and repairs.

But dry docks are hard to build. They not only cost a great deal of money but at times the soil is either solid rock that requires blasting or beneath its surface is threaded with quicksands that defy piling and other methods. So we also have floating docks on both coasts and on the Great Lakes. They are huge, unwieldy structures of wood or steel, and can be towed from one place to another. Large ballast-tanks on the sides and underneath perform, in their way, what the caisson and pumps of the dry dock do. Secured at a spot where there is deep water the floating dock is sunk by admitting water into the ballast-tanks. When a ship enters between its towering walls and is well secured, the ballast tanks are emptied and the buoyancy of the large tanks raises the dock and its burden.

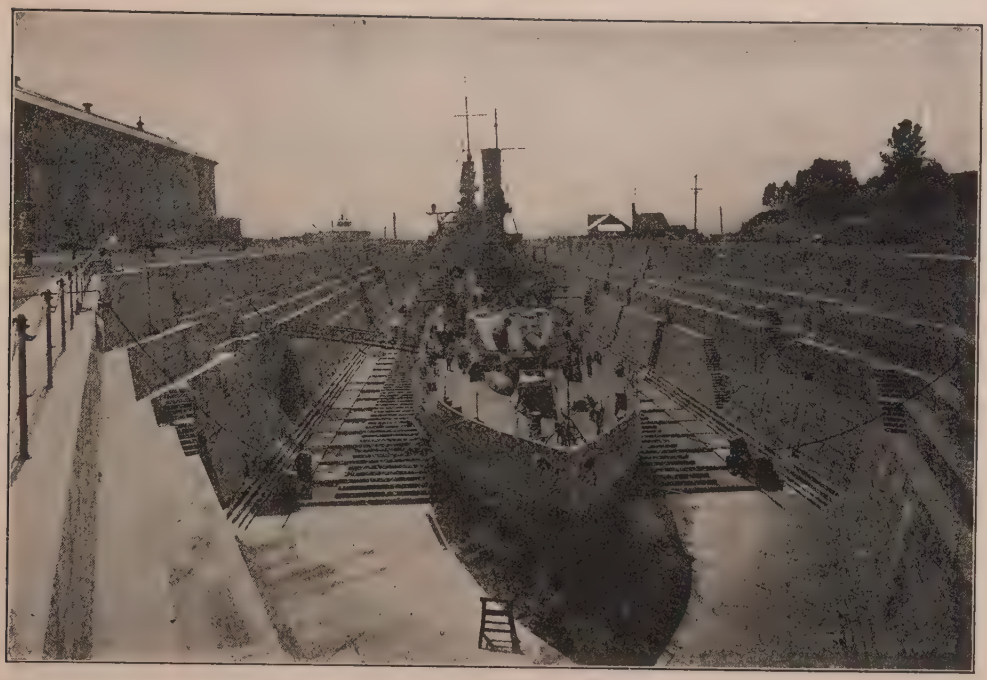
There are times, of course, when a ship, although her bottom is foul, can get along on reduced speed by burning more coal. Often, however, the sea-injection valves, below her waterline, with strainers on the outside, clog up with barnacles. Then she is helpless, for she can get no water and her engines cannot run. Divers, who are carried on all ships of the Navy, are then sent overside in diving-suits, to clear away the troublesome barnacles.

The towing of the floating dry dock *Dewey* from its shipyard at Sparrow's Point, on the Chesapeake, to the naval station at Olongapo, sixty miles up the coast of Luzon from Manila Bay, has gone down in the feats of seamanship. It was a story of gales and monsoons, of snapping steel hawsers, of snail-like progress, and of pluck and perseverance which won over a remarkable series of obstacles that more than once bade fair to end in the loss of the *Dewey* or of the ships that convoyed and towed her on that long trip.

At one time the succession of mishaps had become so disheartening that the Chinese crew of one of the three towing ships, the collier *Caesar,* set off fireworks and tossed overboard colored bits of paper to put to rout the "devils" that were opposing the *Dewey.* The Lascar crew of a ship in the Indian Ocean that passed the strange procession



THE FLOATING DOCK "DEWEY" DOING HER BIT IN THE FAR EAST



MONITOR AND CRUISER SHARE THE SAME DOCK

THE "ILLINOIS" IN THE NEW ORLEANS FLOATING DOCK

A BATTLESHIP IN DRY DOCK

THE "OREGON" DOCKING

at night, brilliantly lighted to warn all craft of the danger of running athwart the tow, was so terrified that it resorted to prayers to strange gods to protect them from the weird monster of the deep pursuing the three colliers.

Before the *Dewey* could enter the Suez Canal came a delay of a week at Port Said while the canal authorities deepened the sidings cut for her. Passing through the canal, where the channel twisted, the huge craft sliced off great stretches of sand from the banks, and at night caravans wondered at the odd sight that the stars outlined.

It was 172 days from the time of the start in Chesapeake Bay when the first ship of the convoy forged through the mountain-guarded entrance to Subig Bay and rounded Grande Island which lies just within. When the *Dewey* hove in sight, with a new American ensign hoisted, the warships in the bay greeted her with the fire of guns and the booming of whistles. The shores were lined with the Tagalogs of the native village, and the seawall of the naval reservation with the bluejackets and the marine battalion.

There she rests to-day, doing yeoman service for the Asiatic Fleet, a monument to American seamanship and pluck and to the men who built her; a daily reminder to the Americans at that lonely naval outpost of the name that humbled Spain's power in the Far East.

In time of war the dry docks and the floating docks are invaluable. If a ship should have her hull penetrated by a torpedo or shell, or damaged by collision, she would first flood the compartments on the other side to keep her on an even keel. Collision mats, made of canvas with one side shaggy with uncoiled manila or hemp roping, would be passed under her, the pressure of the water holding them over the damaged hull. Then, convoyed by other ships, with destroyers guarding her against underwater attacks, she would limp back to the nearest dock for repairs, towed or under her own steam.

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THE BATTLE OF LAKE ERIE

XXXI

SEVEN GREAT SEA FIGHTS

THE one naval action that stands out in the War of the American Revolution was that in which the *Bon Homme Richard* forced the *Serapis* to strike her colors after three hours of as deadly fighting as the sea has ever staged. Commodore John Paul Jones, the hero of this brilliant fight against staggering odds, had already made his name famous by raids in the Irish Sea and on the coast of England.

The *Bon Homme Richard* was the flagship of his makeshift squadron which sailed from Brest, France. She was a converted East India-man, equipped with condemned guns, some of which burst at the first fire, and manned with a crew of mixed nationalities. It was only the genius and indomitable will of John Paul Jones that brought this unwieldy ship her victory over the well-founded British cruiser. Off Flamborough Head, on September 23, 1779, his squadron, the *Bon Homme Richard, Alliance, Pallas, Cerf,* and *Vengeance* sighted two British cruisers, the *Serapis* and the *Countess of Scarborough,* convoying forty merchantmen. It was seven o'clock in the evening when

the *Bon Homme Richard* came within pistol range of the *Serapis,* and for three hours and a half the fight raged between them in the moonlight. Jones' ship was no match in maneuvering, so he closed, lashing her alongside the *Serapis,* with yards entangled and their guns touching each other's engaged sides. The fire of the *Serapis* was incessant and both ships were soon set on fire.

THE ACTION BETWEEN THE "SERAPIS" AND THE "BON HOMME RICHARD" SEPT. 23, 1779

The *Alliance* appeared when the *Bon Homme Richard* was in sore straits, but the treacherous Captain Landais fired three broadsides into her and then sheered off. With his ship leaking badly from the fire of the two ships, half of his crew gone, mutinous prisoners on deck, and but three of his guns fit to fire, Jones was hailed by the *Serapis:* "Has your ship struck?" He thundered back: "I have just begun to fight!"

A well-directed volley of grapeshot crippled the mainmast of the *Serapis,* and the French marines in the *Bon Homme Richard's* tops drove the crew of the *Serapis* from her upper deck, and dropped hand grenades that exploded with great damage below.

Naval History Society

JOHN PAUL JONES

A forlorn cause had been turned into victory by Jones' inspiring example, and the *Serapis,* with her mainmast ready to go by the board, struck her colors. Captain Pearson was knighted for his gallant resistance, and when John Paul Jones heard of it he said: "If I meet him again I'll make a Lord of him."

Early in the War of 1812 was fought the first big action between an American and British frigate, and the victory of the *Constitution* over the *Guerriere* still ranks with the greatest ever won on the high seas. Ship for ship the advantage was slightly with the *Constitution,* but the losses suffered by the *Guerriere* were out of all proportion to this advantage. Better gunnery and seamanship had carried the day for Old Ironsides.

Early in August, 1812, the *Constitution* left Boston, and a Salem privateer gave her word of a large British cruiser standing to the southward. Crowding on sail, the *Constitution* overtook the *Guerriere* on the afternoon of the 19th. By superior tactics she evaded the

Courtesy of the "Scientific American," Copyright by Munn & Co., Inc.

THE "CONSTITUTION" AND THE "GUERRIERE"

broadsides of the *Guerriere* and raked her fore and aft before they closed. A shot carried away the Britisher's mizzenmast, and Captain Isaac Hull shouted to his men: "Hurrah, boys; we've made a brig of her!"

With her mizzenmast trailing over her quarter, the *Guerriere* was raked by both the port and starboard guns of the *Constitution* until her bowsprit lay over the *Constitution's* stern and both ships called away boarders. In the heavy sea boarding was impossible, and,

Naval History Society

THE "CONSTITUTION" AND THE "GUERRIERE"

yard-arm to yard-arm, the fight went on for two hours. The deliberate fire of the American gunners carried away the fore and mainmasts of the *Guerriere* and her main deck guns rolled in the water on the starboard side as she lay a dismantled hulk. Captain Dacres hauled down his flag in surrender, his veteran crew outmatched by the green men who made up Captain Hull's force. The war was but a few months old and the victory made the fifth in which, in single ship actions, the British ship had been captured.

The Battle of Lake Erie, fought between two well-matched squadrons, shed luster on both. Perry's great victory does not rank high in the opinion of naval experts for the strategy shown, but it was

featured by the heroic defense of the *Lawrence* and the *Detroit.* It had a far-reaching moral effect and proved the turning-point in the military campaign on the Canadian border. Unstinted credit, too, is given Perry for the building of the greater part of his fresh-water squadron, under great handicaps, in five months.

The two fleets met at daylight on September 10, 1813, and the British concentrated fire on Perry's flagship, named the *Lawrence,* in honor of Captain Lawrence, killed in the fight between the *Chesapeake* and the *Shannon.* With his rigging shot away, his hull pierced many times below the waterline and his guns dismounted one after another, Perry, with the aid of the purser and the chaplain, fired the last gun himself. Overhead flew a blue flag inscribed in white with the last words of the dying Lawrence: "Don't give up the ship!" This flag Perry shifted to the *Niagara.*

Naval History Society

THE FRIGATE "CONSTITUTION"

The other American ships, which had fought at long range, now closed in and the British suffered heavily. Perry turned the tide in thrilling manner by breaking the British line with the *Niagara,* raking it with broadsides from his port and starboard batteries. Two fell foul of each other, and the *Niagara,* luffing athwart their bows, raked both with guns and musketry fire. It was only after four hours of sanguinary fighting that Captain Barclay of the *Detroit,* a veteran of Trafalgar, surrendered to Captain Oliver Hazard Perry, then but 27 years old. On every ship the first or second in command had been killed or wounded.

Perry's message electrified the American people with its terse statement: "We have met the enemy and they are ours; two ships, two brigs, one schooner, and one sloop."

The era of steam robbed sea fights of much of their romance.

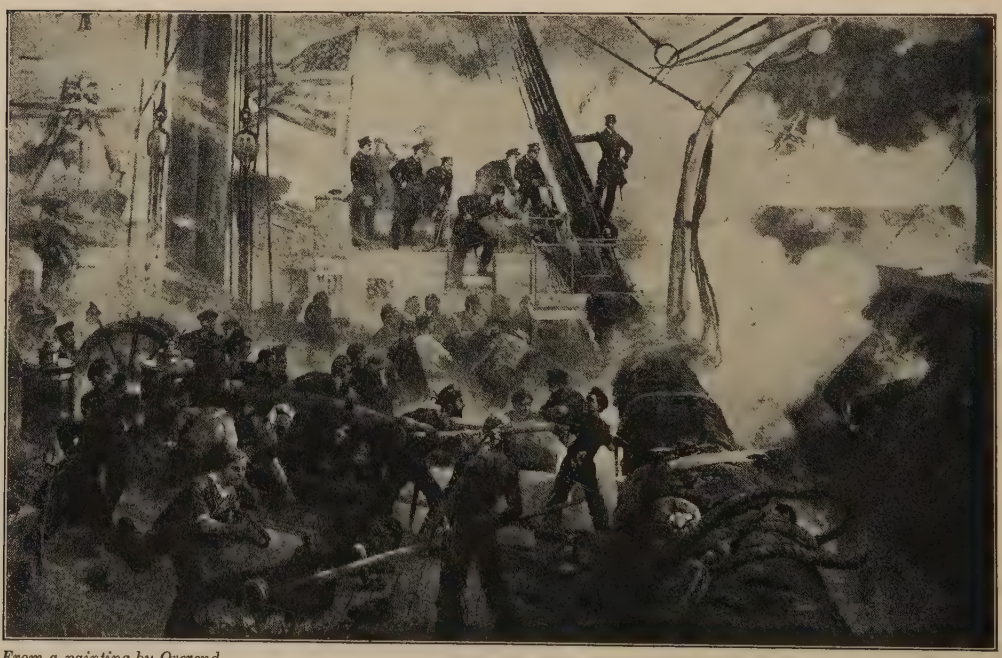
Naval History Society

THE BATTLE BETWEEN THE "MONITOR" AND THE "MERRIMAC"

Advance in gunnery ended the pistol-range duels of the old days, and steam made the handling of a warship a mechanical matter. But the sea fights of the Civil War were waged between wooden ships until the duel between the *Monitor* and the *Merrimac* ushered in the ironclads.

Early in the second year of the war the Confederates built a powerful ram out of the old frigate *Merrimac,* which had been partly burned and sunk at Norfolk. Fore and aft she had been cut away, and amidships a casemate had been erected with its sloping walls armored, over heavy timber, with two layers of iron plates. These plates projected over her hull to protect the waterline, and the hull also had been plated. On her bow, two feet below water, a heavy cast-iron ram had been bolted, and she was armed with heavy rifled guns.

The Union fleet of wooden ships, both sail and steam, was lying at Hampton Roads when the *Merrimac* made its first appearance on March 2, 1862. The broadsides of the *Congress* and the *Cumberland* rattled harmlessly off her iron sides, and before she withdrew later in the day the *Cumberland* had fallen victim to her powerful ram and gone down with her flag flying; and she had wrecked the *Congress,* protected by shoal water from the ram, with her heavy fire. The *Minne-*



From a painting by Overend

AN AUGUST MORNING WITH FARRAGUT

sota, the most powerful ship remaining, had been saved by steaming into shallow water, but her destruction the next day seemed inevitable.

When the big ram steamed back the next morning to finish the fleet she made straight for the *Minnesota.* Out from behind its screen steamed a strange craft that had been hurried down from New York in a gale. "A cheesebox on a raft" she had been dubbed, for Ericsson's *Monitor* was a jest among seafaring men until she proved her worth that memorable day. Her decks were but a foot above the waterline, and from her center rose a movable turret nine feet high, and covered with iron plates. Two 11-inch guns firing solid shot were mounted in the turret, and when she went into battle her smoke-stacks were taken apart and laid on the deck. She was one-fifth the size of the *Merrimac,* but boldly barred her path.

The ram's rifled guns made no impression on the round turret, but when the *Monitor* opened fire she started the plates of the *Merrimac.* With this advantage of her guns, and her ability to dodge the *Merrimac's* ram, the odds were too much for the latter. She withdrew, badly damaged, and the little *Monitor* kept guard over the fleet. The *Merrimac* was blown up later by her own men to save her from capture by the advancing Union Army.

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THE "KEARSARGE" AND THE "ALABAMA"

ADMIRAL GEORGE DEWEY'S FLAGSHIP THE "OLYMPIA"

Greatest of all the engagements of the Civil War and ranking as our greatest sea fight, was the Battle of Mobile Bay. From it Admiral David Farragut emerged second only to Nelson. In the War of 1812 he had fought as a midshipman on the *Essex* and his career showed the inborn genius and bravery of a great sea captain.

The only port left open to the Confederates in August, 1864, was Mobile. Forts Morgan and Gaines commanded the narrow entrance to Mobile Bay. Behind the channel mined with torpedoes lay a Confederate squadron when Farragut attacked on the misty morning of the 5th. With fourteen wooden ships, one of which was his flagship, the *Hartford,* and four monitors, Farragut made for the entrance. His seven strongest wooden ships were on the right and to each was lashed on the left a smaller one. Between this double column and Fort Morgan, the more powerful of the forts, steamed the monitors.

Close to Fort Morgan they steamed, heavy broadsides answering the terrific fire of the forts. The Confederate ram *Tennessee,* one of the most formidable ironclads afloat, and the rest of the Confederate ships opened fire on the advancing fleet, and heavy losses were registered early. The forts were powerless to stop the fleet in the narrow channel, and fortune favored Farragut until his leading ship, the monitor *Tecumseh,* struck a torpedo and sank almost instantly. The steamer *Brooklyn,* backing to avoid another torpedo, halted the column under the fire of the forts. Farragut, heedless of the torpedo-sown channel, went full-speed-ahead, cleared the *Brooklyn;* and the column, following his lead, gained the bay.

Here the smaller ships were cast off to engage the Confederate

gunboats. The *Tennessee* rushed in single-handed. One after the other, Farragut's wooden ships rammed her, and when the slow monitors came up their guns reduced her to impotence. In the three-hour fight that ended with the surrender of the *Tennessee* the great admiral had lost 335 killed and wounded and the monitor *Tecumseh* had been sunk, but his ships had silenced the forts, defeated the Confederate squadron and sealed to outer communication with the sea the last port of the Confederacy.

It was three days after war was declared against Spain that President McKinley cabled to Commodore George Dewey to capture or destroy the Spanish fleet in the Philippines. Dewey was at Hong Kong, China, with the Asiatic Squadron comprising the flagship *Olympia,* the *Baltimore, Boston, Raleigh, Concord, Petrel,* and the revenue cutter *McCulloch.* Under cover of night he steamed past the Spanish batteries on Corregidor Island, and into Manila Bay, on May 1, 1898. At daybreak the Spanish fleet was sighted lying off the navy-yard and arsenal at Cavite. Admiral Montojo was on the *Reina Christina* with eight other ships under his command.

At the speed of eight knots the American fleet moved to the at-

Photo by Melehers

FARRAGUT'S FLAGSHIP THE "HARTFORD" WITH DEWEY'S FLAGSHIP THE "OLYMPIA" IN THE BACKGROUND

tack, led by the *Olympia.* The heat was intense and the gun crews were stripped to the waist. Two mines exploded ahead of the *Olympia* without damage to her before Commodore Dewey turned to Captain Gridley with his memorable order: "You may fire when ready, Gridley."

An eight-inch gun in the forward turret fired the first shot at the range of 5,500 yards in the battle that was destined to make the United States a world-power with possessions in the West Indies and the Far East. A shell struck the water almost at the *Olympia's* bow, one fragment cutting the rigging above the forward bridge and another tearing a hole in the deck. Dewey answered with a port broadside and ran four times down the Spanish line with his ships pounding the Spanish cruisers and gunboats. On the fifth turn he had closed in to 2,000 yards, and even the light guns of the fleet were working havoc on the decks of the enemy. Three had burst into flames under the accurate fire.

THE LITTLE "GLOUCESTER" ENGAGED THE SPANISH TORPEDO BOATS AT CLOSE RANGE

Then came a halt for breakfast and a count of ammunition, beyond the range of the Spanish guns, and it was a quarter to eleven when the battle was renewed, with the *Baltimore* leading. In two hours the Spanish fleet was destroyed. All had been either sunk or burned to the water's edge by gunfire and by boats' crews. The flag of Spain on the Cavite arsenal had been replaced by a white flag, and Manila lay under the guns of our victorious fleet. Eight of our men had been wounded, none killed, and the ships bore little more than scars. In the Spanish fleet nearly 200 had been killed and almost 300 wounded.

Congress voted Dewey a sword of honor and restored for him the rank of Admiral of the Navy, an honor that only Farragut and

Porter had shared. His return to the United States by way of the Suez and the Mediterranean was the occasion for honors that culminated with a great celebration in New York on Dewey Day. On his death at Washington, January 16, 1916, the nation united in the last honors to the great sea captain who will always live in its memory with Farragut and Porter.

The fight off Santiago, Cuba, on July 3, 1898, ranks as the greatest sea fight in American history in the power of the squadrons that were engaged. Cervera's squadron had been "bottled up" in San-

IT WAS CAPTAIN PHILIP OF THE "TEXAS" WHO SAID: "DON'T CHEER, THE POOR DEVILS ARE DYING"

tiago by the North Atlantic Squadron under command of Rear-Admiral William T. Sampson. On the morning of the 3d it dashed out of the narrow entrance and in the running fight that followed every ship in the luckless squadron was either captured or sunk.

As the Spanish, led by Admiral Cervera on the flagship *Infanta Maria Teresa,* came out they turned to the right and fled down the coast at full speed. The American fleet was prepared and their fire caught the leading ship and she made for the beach a mass of flames.

Next the *Oquendo,* riddled by shell-fire, was beached to save her crew. The *Vizcaya,* also afire, went on the reef fifteen miles west of Santiago, and her forward magazine exploded. Meanwhile the *Gloucester,* a converted yacht and lacking armor, had engaged the destroyers *Pluton* and *Furor* close inshore. Lieutenant Commander Richard Wainwright, though outmatched by either, stood direct for them. The accurate and rapid fire of his light guns destroyed first the *Pluton* and then the *Furor,* while the little *Gloucester* escaped unscathed.

Now came the most thrilling moments of the fight, for the *Colon* was in full flight with the *Oregon, Brooklyn, Texas,* and *New York* in pursuit. At the end of a three-hour chase the *Oregon* was the first to get her range, and the roar of a 13-inch shell that barely passed over her made her strike her colors in surrender.

On the *Brooklyn* we had lost one killed and one wounded, while the losses in the Spanish fleet were more than 250 killed and drowned, 150 wounded, and more than 1,800 prisoners. The *Oregon* was the hero of the fight, for after having rushed 15,000 miles around the Horn, passing through the Straits of Magellan in a gale, she had outraced the rest of the fleet in the chase of the *Colon.* To-day her full broadside would be drowned in the roar of the *Pennsylvania's* twelve 14-inch guns, and the *Pennsylvania,* single-handed, could beat a fleet of the old *Oregons.*

The Santiago Battle ended Spain's resistance on sea; and with the menace of its fleet gone the combined military and naval operations resulted in the speedy end of the war.

Photo by Paul Thompson, N. Y.

THE S. S. "TITANIC" LEAVING SOUTHAMPTON ON HER MAIDEN VOYAGE

XXXII

TRAGEDIES OF THE SEA

THE sea takes heavy toll with its countless shipwrecks. Hurricanes, typhoons, mountainous icebergs, treacherous shoals, tidal waves and the gales of midwinter all contribute to their share of marine disasters. In foggy or misty weather comes the added danger of collisions. Only a few of the most famous disasters that have befallen American ships and passengers need be told to illustrate the dangers that lurk at sea.

One of the most remarkable accidents that ever befell any ship, but which, happily, entailed but little loss of life, wrecked the U.S.S. *Monongahela* in West Indian waters. She was at anchor in the roadstead of Fredericksted, then the port of the Danish island of St. Croix, on November 18, 1867, when suddenly she began to quiver from stem

to stern. The sea was calm but immediately the water began to recede from shore. It came back with such a strong current that the *Monongahela's* chain cable was torn adrift and ran out through the hawsepipe. Another anchor was let go, and an effort made to pay her head offshore to take advantage of the checking of the current and a light offshore breeze.

She was making headway into deeper water when a great tidal wave, twenty-five feet high, rushed in from the sea. It carried the ship bodily over the warehouses on the shore and landed her on her keel in the street fronting the water. By an odd chance she lay directly in front of the store in which Alexander Hamilton had once worked as a clerk. On the return of the tidal wave the *Monongahela* was once more thrown back toward the beach. When the wall of water had receded, and the sea was again calm, the stranded vessel lay keeled over at an angle of fifteen degrees on a coral reef. In this precarious position the *Monongahela* appeared to be doomed.

Three men who were in boats tied up at the boom were lost, but

THE "VANDALIA" WAS A VICTIM OF THE SAMOAN HURRICANE

Photo by Stebbins

A DISMANTLED SCHOONER TOWED INTO PORT

those on board escaped without injury. Commodore S. B. Bissell, who was in command, began repairs to his ship and from the United States, under whose control St. Croix and the other islands of the Danish West Indies passed early in 1917, eight anchors and a thousand fathoms of chain cable were supplied. Launching ways were built and with the anchors and cable the *Monongahela* was hauled into deep water. Twenty-five days from the dramatic appearance of the tidal wave she was afloat, and soon after left for New York under her own power.

One of the most tragic disasters ever enacted at sea was that of the Samoan hurricane of March 16, 1889. At the time there was friction between the United States and Germany over Samoan matters. In the unprotected anchorage of Apia lay the United States ships *Trenton, Vandalia,* and *Nipsic,* the German *Eber* and *Adler*, and the British *Calliope.* After a day of heavy seas combed by a northerly gale the hurricane broke in full force over Apia soon after midnight of the 16th. As the hurricane swelled to its height the danger of collision in the crowded anchorage, and the proximity of the coral

THE CRUISER "MEMPHIS" THROWN ON THE ROCKS IN SANTO DOMINGO BY TIDAL WAVE

reefs that guarded its entrance, added to the dangers of the terrifying wind and the seas that broke over the decks.

The *Trenton's* chain cables parted on three of her anchors, one by one. Her wheel was wrecked, and water in her hold gained on the pumps. Hand pumps were manned to save the fires from the water, and then, through the sheets of flying water that obscured the anchorage, the crew of the *Trenton* saw the British steam frigate *Calliope* standing out to sea. She passed so close that her foreyard lay over the *Trenton's* deck, clearing her by inches. As her powerful engines fought against the hurricane Rear-Admiral L. A. Kimberly of the *Trenton* called for three hearty cheers. They came with a will, "the doomed saluting the saved," and the *Trenton's* band struck up "God Save the Queen" as the *Calliope,* fighting inch by inch for the open sea, forged ahead.

When the *Calliope* passed her the *Trenton's* fires had gone out, and she lay helpless, her doom apparently a question of hours. Every man on board knew it, yet in the face of death they gave their tribute to the magnificent effort of the British ship. Captain Kane of the *Calliope* afterward said: "Every man on board the *Calliope* felt as I did; it made us work to win. I can only say, 'God bless America and her noble sailors!' "

All day the *Trenton* dragged, barely missing reefs that would have torn her sides open, until she struck bottom. Here she brought up alongside the wrecked *Vandalia,* whose masts were all that showed above water. Lines were shot across and the crew and officers in the *Vandalia's* rigging and tops were saved by superhuman efforts. The spot that marked the *Vandalia's* death soon claimed the *Trenton.* The *Nipsic* went hard aground but was afterward salvaged. Through the surf sailors and natives formed human chains and saved many who had been washed overboard as the American and German ships pounded to pieces.

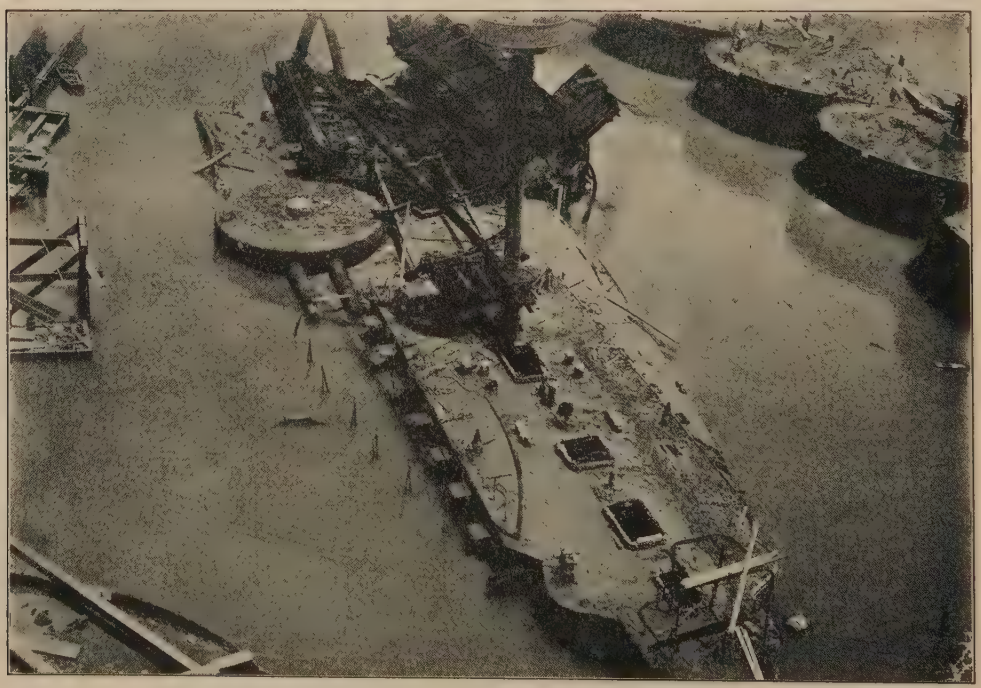
The little *Eber* had gone down almost instantly after the hurricane broke. The *Adler* had been lifted by a giant wave over the edge of the reef and toppled over on its deck well inshore, with part of the keel torn off.

The *Nipsic* suffered our heaviest loss, with forty-three men and four officers, including her captain; but none escaped unscathed. The sea exacted its toll from all but the *Calliope.* Waves tore men out of the rigging and dashed them onto the decks. Others were swept from the decks, and many drowned before the men battling in the surf could reach them.

The sinking of the second-class battleship *Maine* in the harbor of Havana in 1898 was without parallel in its staging and its results. It made war between the United States and Spain inevitable. The rallying cry of that war on land and sea was, "Remember the *Maine!*" To-day the exact truth of the blowing up of the *Maine* is still wrapped in mystery, but the finding of the Naval Court of Inquiry, held at Key West, announced to the world that "In the opinion of the Court the *Maine* was destroyed by the explosion of a submarine mine, which caused the partial explosion of two or more of her forward magazines." This opinion is generally held.

Conditions in Havana were much disturbed early in 1898, and the *Maine* steamed into the harbor, past Morro Castle and Cabanas fortress, on January 25th. Consul General Fitzhugh Lee had reported that Americans were in danger of mobs and without a place of refuge. She was taken to a mooring buoy directly off the center of the city by a Government pilot; and then followed the usual visits of courtesy between Captain Charles D. Sigsbee and the Governor-General of Cuba, and lesser officials.

It was evident that the presence of the *Maine* was not popular, but there were no untoward incidents until the night of February



RAISING THE "MAINE"

THE WRECK OF THE "MAINE" THE DAY AFTER THE EXPLOSION

15th. It was exactly 9:40 o'clock when the shock of an explosion lifted her bow out of water. There followed a second shock, and then a tremendous explosion forward blew up her decks and the *Maine* settled in the water. Private Anthony, the Captain's marine orderly, immediately searched in the darkness for Captain Sigsbee and, when he found him, following the formula of the sea that everything must be reported, saluted and said: "Sir, the ship has blown up and is sinking!"

Fire broke out and the uninjured boats were lowered and the ship abandoned after a thorough search for wounded men. The Spanish warship *Alfonso XII* and the American merchantman *City of Washington* took aboard the survivors. Divers were sent to Havana by the Navy Department and their report was made known to the Court of Inquiry at Key West. The total loss of officers and men on the *Maine* was 267, and the nation was plunged into mourning. Sixty-four days later war was declared by Congress.

The *Maine* was afterward raised by action of Congress, her shattered hull patched up, and she was then towed to sea and sunk with her flag flying. Her dead were buried at the Arlington National Cemetery with fitting ceremonies.

UNVEILING THE "MAINE" MONUMENT

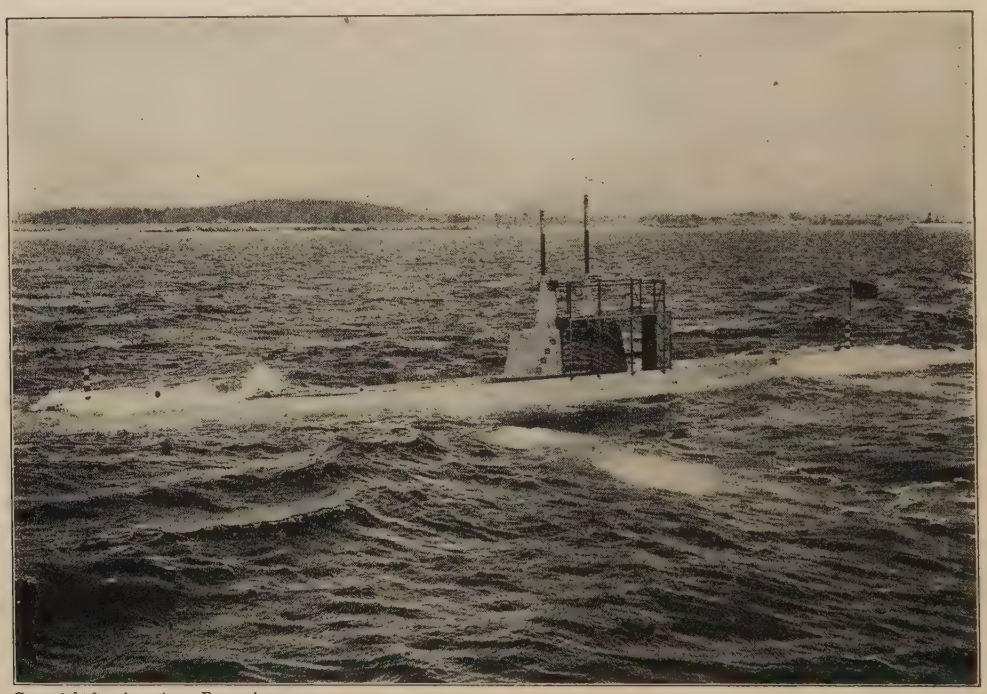
When the White Star liner *Titanic* sailed from Southampton, England, for New York on April 10, 1912, on her maiden trip, she was the largest steamship in the world. Her cabins were filled with men and women of distinction, and Americans were prominent among them. She was considered to be the last word in ocean liners, and unsinkable with her fifteen watertight bulkheads and a watertight inner bottom. With a displacement of 46,000 tons, length of 885 feet, beam of 92 feet, and triple screws, she held within her steel hull all that science, luxury, and power could combine in a single ship. Five days later she was at the bottom of the ocean. Out of her complement of 2201 passengers and crew only 711 were saved.

DIVERS LOCATING THE F-4

It was night when the *Titanic*, running at the speed of twenty knots, struck a giant iceberg. There was a sudden shock, but at the time the passengers did not dream that a berg had been struck. Small bits of ice on the forward deck were the only outward sign at first. The band began playing, and meanwhile tons of icy water were pouring into the holds. The ice was far south of its usual haunts, but the air had been unusually cold and the steamers *Caronia* and *Baltic* had that morning wirelessed warnings of icebergs. Secure in the belief of her invincibility, however, the *Titanic's* course had not been altered and she had steamed to her ruin.

Her wireless operator sent the call of S. O. S. throbbing into the black night. She settled slowly by the head, listing to port, but when it was seen that her end was sure there was no panic on board. Officers armed with revolvers took stations at the boat falls and the women and children were hurried off. There were not enough boats to take

all the passengers. An attempted rush for the boats by a few steerage passengers was stopped by a few warning shots. When the last boat left there were fifteen hundred on the *Titanic's* slanting decks. She sank by the head, slowly at first, then dived almost vertically. Lighted as brilliantly as the night she left England, the *Titanic* went down in that last plunge, and from her decks men and women slid down into the vortex. Her boilers burst as she sank and nothing was left to mark where the pride of the seas had been but drifting wreckage and



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THE F-4 WHICH WAS LOST OFF HONOLULU

small boats in which women took their places at the oars to keep from freezing. The *Carpathia* and *Olympic* had been the first to answer her wireless and, boatload by boatload, picked up the survivors and then steamed to the westward with the tragic news.

The loss of the submarine F-4 off Honolulu is a typical tale of the dangers that submarines run even in the carrying out of routine maneuvers. Trapped in the hull of a sunken submarine death comes as the only relief while the outside world counts the days until hope is abandoned. Following the raising of the ill-fated craft to the surface with its crew of dead men, naval experts generally derive some

new lesson in the building of undersea craft that will make them more safe.

The F-4 stood out of Honolulu Harbor with the F-1 and the F-3 for a submerged run on the morning of March 25, 1915. She submerged off Diamond Head and never came to the surface until the salvage crew raised her more than five months later. When the other two submarines returned within an hour the non-appearance of the F-4 caused alarm. It was noon when a motorboat sighted air bubbles and the slick of oil on the surface a mile from the channel entrance in water two hundred fathoms deep. Other bubbles showed closer inshore where the water shoaled rapidly. Divers were sent down to a depth of 300 feet in diving-suits after two expert divers without suits, but wearing divers' helmets, had gone down to a depth ranging from 190 to 215 feet.

It was seen that the only chance of rescue lay in dragging the F-4 into shallow water where the rescue work could be better carried on. Dragging failed and then the salvagers passed chains under her and she was lifted and towed into shallow water. It took three days to place the chains because of the swells and heavy undertow. By this time all hope of saving the lives of the F-4's crew had to be abandoned. Only after months of preparation, delayed by broken hawsers, snapped chains and storms was the submarine finally brought to the surface. She was so badly damaged that, while the bodies were rescued, the cause of the accident that held her on the bottom of the harbor for five months will never be clearly known.

THE "SHENANDOAH" SHORTLY BEFORE HER WRECK IN 1925

XXXIII

AIRSHIPS AND AIRCRAFT CARRIERS

STRIKINGLY different from the seaplanes, which are technically classed, as with the land plane, as heavier-than-air craft, are our lighter-than-air craft. In all the heavier-than-air craft embrace three types of airships, the non-rigid, semi-rigid and the rigid airships; and in addition the two principal types of balloons, the captive or kite balloon, and the free balloon. While the balloons are of limited use in naval warfare, and the non-rigid and semi-rigid airships are at present employed largely for training and experimental use, the rigid dirigibles are of particular interest as of possible great value in the future sea battle.

The aircraft carrier has also leaped into striking importance. Briefly it ranks third only to the battleship and battle cruiser in its offensive power as a unit of the Fleet, for it is a speedy carrier of seaplanes, armed with 8-inch guns, able to out-distance all but the speediest of surface craft, and capable of a stiff defense against attacking aircraft, small cruisers, destroyers and the underwater craft. It is gratifying to know that both in the rigid dirigibles and in the aircraft carriers the United States Navy has been second to none in their development, and fully recognizes the great rôle that they may play in a great sea action.

THE "SHENANDOAH" APPROACHING HER MOBILE BASE THE "PATOKA"

The airship has always appealed to our imagination, and the sight of a great airship cruising through the heavens, is awe-inspiring in its beauty and graceful bulk. The French built and operated the first power-driven airship in 1852, with a speed of 5 miles an hour. Santos-Dumont, the Brazilian, revived interest in the development of airships by his experiments that finally, in 1906, achieved a speed of 23 miles per hour for a short flight. From that time airship development made rapid strides. When the World War began in 1914 the Germans owned a fleet of rigid airships known as the Zeppelins, the largest 512 feet long and carrying a load of ten tons. The British, lacking this superior type, depended on non-rigid dirigibles for coastal patrol, that were able to keep the air for 61 hours.

The military results of the German Zeppelins, which made a total of 217 raids against English points, were negligible, despite the terror that their night attacks inspired. The casualties inflicted by their bombs totalled only 857 killed and 2,050 wounded. Their effectiveness lessened materially as the means for defense against them multiplied. The masking of cities and other points of attack in darkness by rigid rules forbidding the display of lights, the use of incendiary bullets by the defending aircraft, the development of a deadly barrage accompanied by the use of powerful searchlights to illuminate the Zeppelins, and improved methods for gaining and spreading information of their approach finally put an end to their raids.

We now know that this powerful German Zeppelin fleet numbered

U. S. Navy Official Photo

THE "SHENANDOAH" MOORED TO THE "PATOKA"

96 Zeppelins. Thirty-six of them were destroyed in action, 29 by accidents or storms, and but 17 were intact at the end of the war. A smaller type, known as the Shutte-Lanze airship, brought the grand total of the German airship fleet to 116, but the end of the war saw a total of only 18 remaining.

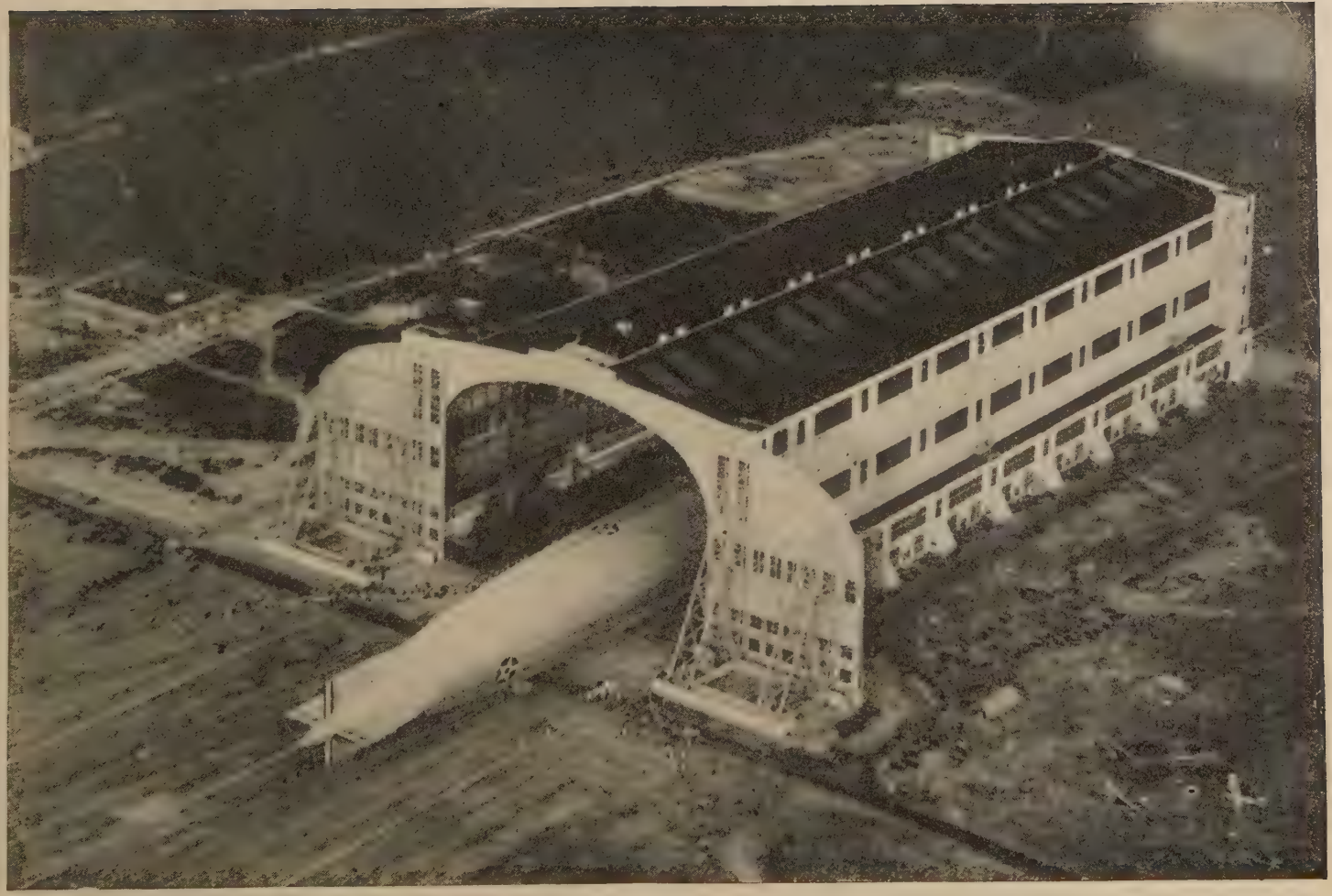
THE ILL-FATED "SHENANDOAH" AT THE LAKEHURST STATION

In addition to these raids, the main object of which was to strike terror among the noncombatants hundreds of miles behind the fighting front, and create economic disaster, the German airships aided the High Sea Fleet by patrolling the North Sea when conditions were favorable, and contributed in no small degree to the German scouting operations.

Naturally the appearance of airships in military and naval operations stimulated interest in their further development when peace came. The Germans, with their lead in the Zeppelins, were forced to turn towards commercial development of this type of dirigible. Through a contract with our government they delivered the *Los Angeles*, 658 feet long, 91 feet in diameter, with 2,600,000 cubic feet capacity, and a speed of 63.7 knots. In her flight across the Atlantic for delivery to the United States Navy this giant of the air carried a load of 82 tons.

THE CARRIER PIGEON OF THE NAVAL AIR SERVICE

Experiments with the *Los Angeles*, one of the most important of which was her flight to Bermuda and return, speedily de-



THE GIANT HANGAR OF THE LAKEHURST STATION

veloped defects, as well as virtues, that led to our construction of the far mightier *Shenandoah* at the Lakehurst, New Jersey, Aeronautic Station. With a length of 680 feet, diameter of 79, a cruising speed of 50 miles for 5,000 miles, and full speed of 60 miles an hour, the *Shenandoah* was indeed Queen of the Air, until destroyed in a violent storm in September, 1925. In shape she was like a great cigar with

THE EXPERIMENTAL AIRCRAFT CARRIER "LANGLEY"

slightly blunted ends, and her silver-hued envelope glistened in the sun.

The gas which lifts our airships, helium, is found in quantity only in the United States. Helium is heavier than hydrogen, but has the great virtues of being non-inflammable and non-explosive when mixed with air. Naturally the use of this gas has much lessened the former vulnerability to gunfire from surface or aircraft, or to aerial bombs.

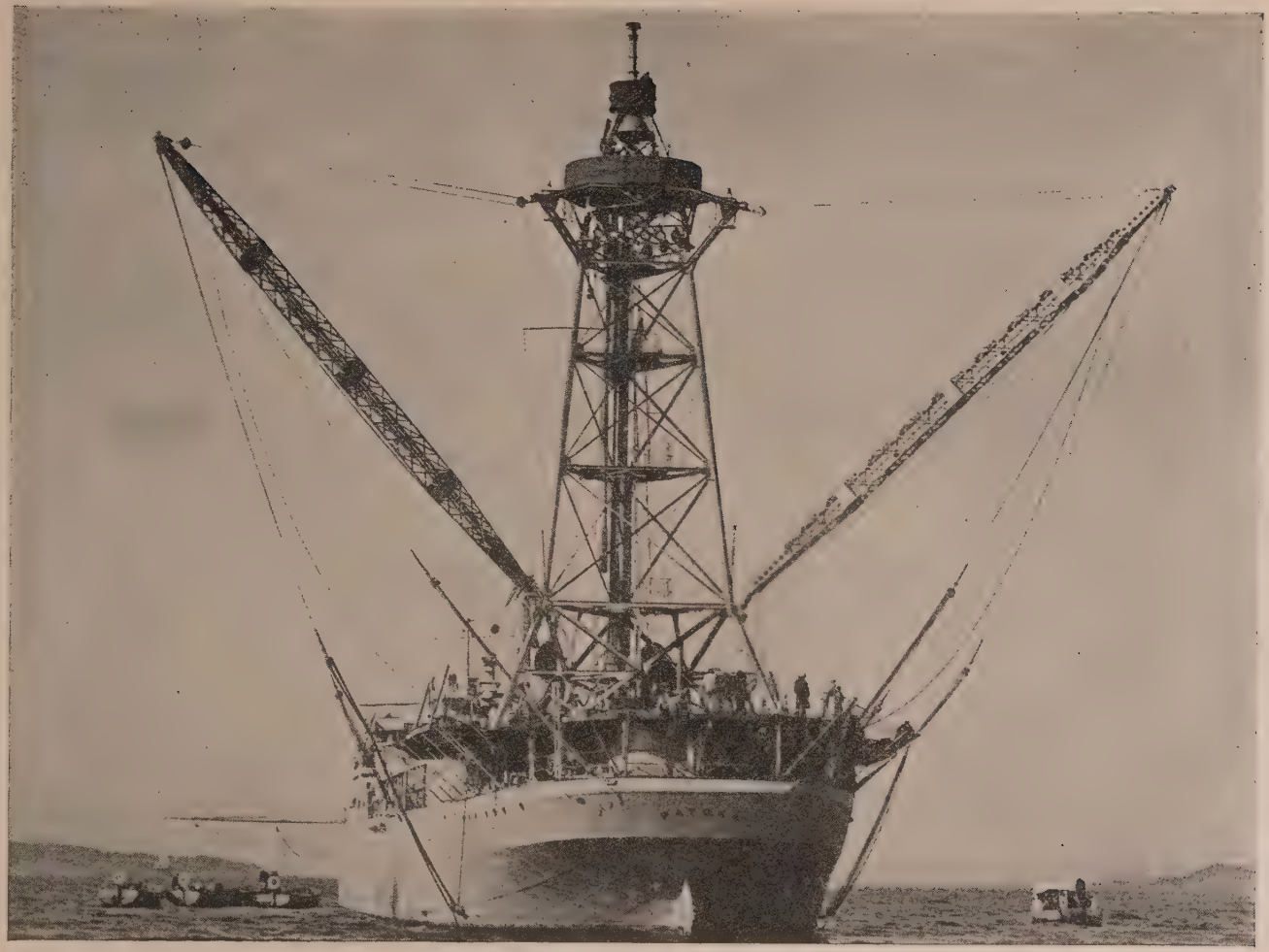
THE NAVY BLIMP

Helium is not only rare but expensive. When first tried it was found that as the gasoline fuel used to drive the airship was consumed, it was necessary to release a proportionate amount of the costly helium to prevent the airship from rising with its lighter weight. Such a waste of helium was prohibitive in its cost. An ingenious method wiped out this difficulty. By condensing the water in the exhaust gases from the dirigible's engines an equal weight of water is recovered to that of the fuel consumed, and the release of helium is no longer necessary.

Not only is the cost of helium a great item in the operation of our big dirigibles, but the total cost of the *Shenandoah* was $2,950,000. The hangar at Lakehurst was built at a cost of $3,500,000. The helium plant at Fort Worth, Texas, alone cost $5,000,000. The dirigibles must have mooring masts at strategic points to moor at where hangars are not available, and, when operating with the fleet, specially designed tenders with the ingenious mooring masts must be provided. It is not difficult to see that the expansion of our dirigibles, with their great cost, their comparatively short life, and their fragile frames, will be limited by their great expense of construction and operation. Within the construction of the *Shenandoah,* for instance, were 20 gas cells, lined with goldbeaters' skins, and it has been estimated that portions of the intestines of 900,000 cattle were used in this construction. These gas cells had a gas capacity of 2,115,000 cubic feet, costing $250,000. The crew normally is 4 officers and 25 enlisted men.

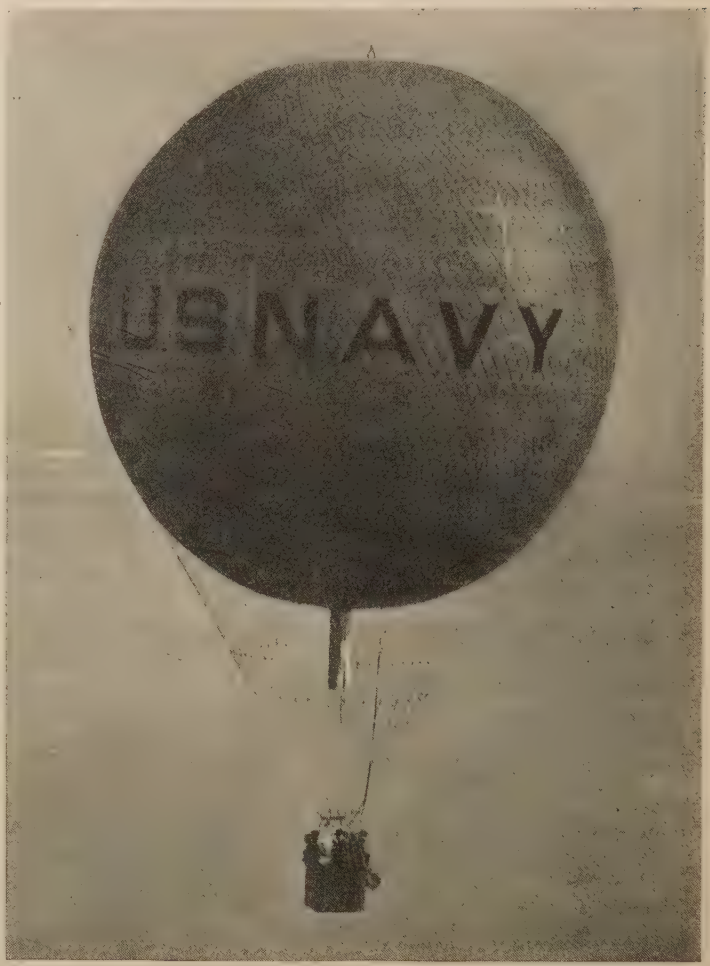
In time of war the greatest value of the big dirigibles will be their

TORPEDO PLANES TAKING OFF IN FORMATION



THE MOORING MAST OF THE "PATOKA"

ability to carry crew, provisions, fuel and bombs over a wide area of operation. Under favorable conditions they can scout, with their cruising speed of 50 miles an hour, far beyond the limit of the heavier-than-air craft, to gain information of the enemy. With their bombs they have a great offensive power against ships or bases under the most favorable conditions. Should a dirigible, miles beyond the area scoured by surface craft, submarines, and the planes of a fleet, discover the enemy, and relay back the information, that feat alone might bring victory in the coming conflict between two great fleets.



THE NAVY USES BALLOONS FOR TRAINING PURPOSES

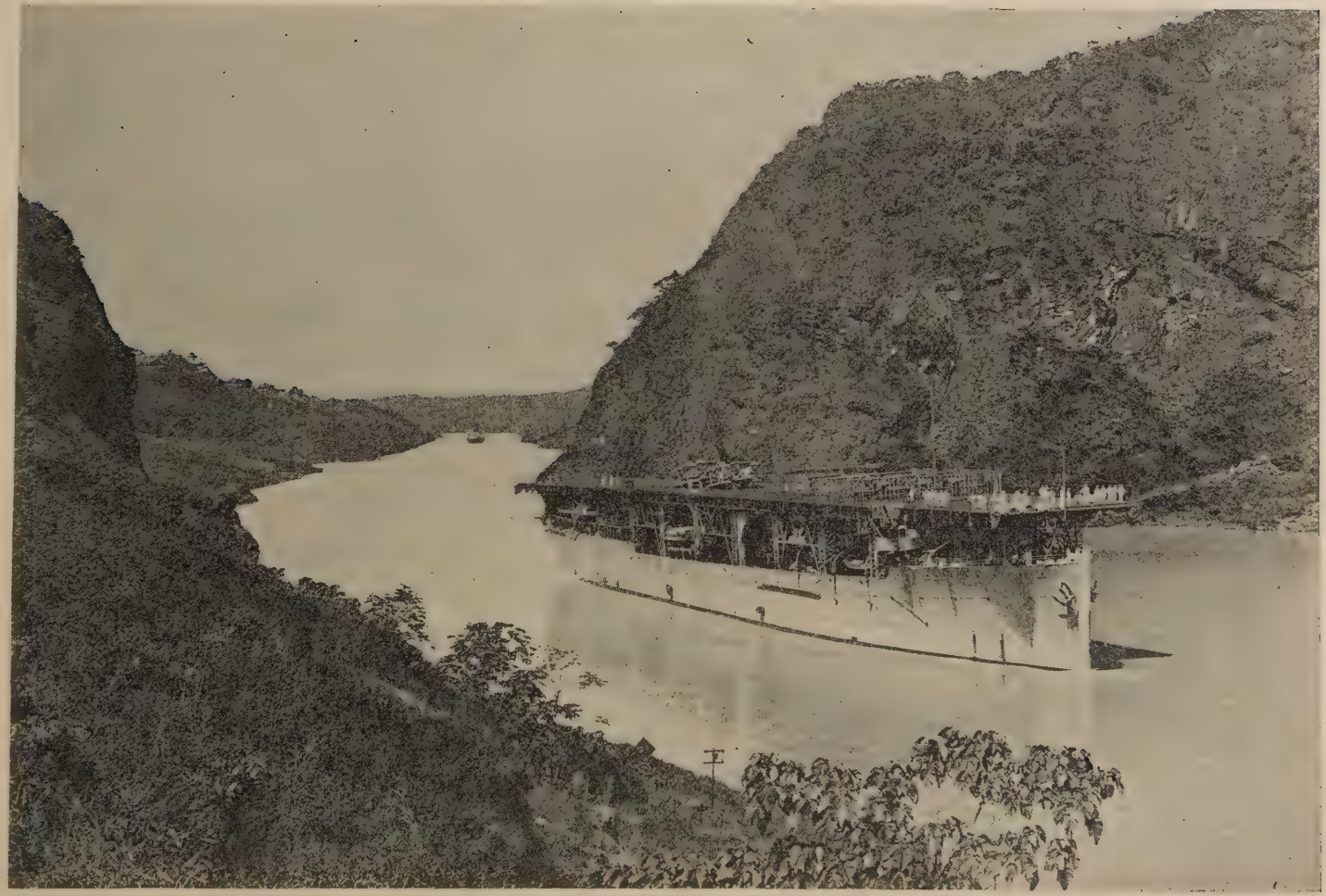
Airships, however, have serious limitations that will make their real value in battle problematical. They cannot operate at very high altitudes. When the *Los Angeles* in her trip for the observation of the 1925 eclipse rose beyond a certain height the water froze in her water-recovery plant, and she was forced to release a large amount of helium in order to land. They cannot operate efficiently in gales, although the *Shenandoah,* through marvelous handling, had ridden out a gale of 70-mile velocity before her tragic destruction in the storm that wrecked her. In her first Bermuda trip the *Los Angeles,* running

into a rainstorm, had her canvas covering so saturated that her water ballast had to be released. This done she was obliged to operate with her nose upward and had to return without landing. When attacked by a swarm of fighting planes she lacks the ability of quick maneuver to escape their hail of machine-gun bullets. Head winds cut down the dirigible's speed almost equal to the strength of the opposing wind. Storms or strong winds make their navigation difficult. They cannot enter their hangars or leave them when a cross wind is blowing. Moored to their mast they cannot survive a thunderstorm.

A fleet must fight in any weather, irrespective of heavy seas, wind or fog, and the next great sea action will find the aircraft of all types, from the great dirigible down to the smallest plane, dependent on the state of the weather.

For many years prior to the World War the German Zeppelins maintained a regular passenger service between their cities. To-day there is a growing interest in the development of commercial use of dirigibles as well as planes. The transcontinental flights of the *Shenandoah,* and the trans-Atlantic flight of the *Los Angeles* have demonstrated the increased safety and reliability of long commercial

THE CARRIER'S FOE, RUNNING SUBMERGED, DETECTED BY SEAPLANE



THE "LANGLEY" IN THE PANAMA CANAL

BOMBERS IN FLIGHT FORMATION

THE AIRCRAFT CARRIER "LEXINGTON" COMPARED WITH THE ONCE MIGHTY "OREGON"

flights. The practical value, however, is limited by the load they can carry in addition to the necessary load of fuel, equipment and crew. Light express freight and passengers can be handled if the profits make such commerce profitable. Federal aid, and a quickened pride and interest may finally see a fleet of dirigibles on established American routes.

The newest type of capital ship, the aircraft carrier, is in reality a floating base from which large numbers of planes can be launched into the air. Before they were designed, as a lesson of the World War, no surface ship carried more than two or three seaplanes. Once in the air they found return difficult to that small base, and were subject to injury riding out a heavy sea, or in being hoisted back on board. The modern carrier has space for 75 planes and a flying deck from which they can take off, or on which they can safely land.

With a speed of 34 knots they are second only to the fastest destroyers, and can run away from all ships of heavier armament. For defense or attack against surface vessels our two largest carriers, the *Lexington* and *Saratoga,* have eight 8-inch guns and heavy torpedoes, as well as their swarm of fighting and bombing planes. For defense against the air they have their fighting planes to attack an enemy bombing squadron, and twelve 5-inch anti-aircraft rapid-firers. Half of their quota of planes are bombing planes, for their main objective is the capital ships of the enemy's battle line. At the beginning of the Spanish-American War the combined horse-power of the American Navy was 395,000, while the *Lexington* and *Saratoga,* in their combined horse-power, almost equal it with 360,000. The *Lexington* and *Saratoga* were first laid down, with others of their type, in 1917 as battle cruisers. In the Treaty for the Limitation of Naval Armament the United States, however, to gain concessions from others of the powers in the effort to end the race of warship construction, agreed to complete no battle cruisers. Under the terms of that treaty we converted the partially-built *Lexington* and *Saratoga* into aircraft carriers of 33,000 tons displacement. The reduction in weight was mainly affected by the elimination of the great eight 16-inch guns and their twin turrets.

Battle will not find them concentrated in the main battle-line like the battleships, or on the wings like the battle-cruisers. Their vulnerablity to heavy gunfire will most probably see them separated and in the rear of the battle-line or its flanks where they will not be subjected to destructive fire.

When the fleets lock in action one of their prime objectives will

PLANES ARE HOISTED ABOARD A BATTLESHIP BUT FLY ABOARD A CARRIER

be the aircraft carriers with their cargo of fighting and bombing planes. The fire of surface ships, the torpedoes or destroyers and bombing flights from overhead will be directed against them. If a shell or bomb should wipe out the carrier's flying deck her threat in the air is practically eliminated. A single shell, torpedo or bomb may sink the carrier and with it the planes on board, while those in the air must seek refuge on another carrier or court ultimate disaster when their fuel is expended. Once a fleet's air strength is practically wiped out or crippled by damage to its carriers it is exposed to bombing flights, and must face a fire controlled by the enemy's intact air force.

Aircraft operating at sea must have a dependable landing place. We have shown that a carrier, which supplies this floating base, is exposed to attack by enemy bombers, so the carrier in turn must defend itself against the enemy carrier's bombers by its own aircraft and attack with its own bombs. The carrier, too, is exposed to attack by the stealthy submarine, so in battle it must be protected by its own anti-submarine screen of destroyers. It must have its own supply ships, or tenders, when operating away from its shore base, and these supply ships, in battle, must seek the protection of the fighting ships of the main body. So we see that the introduction of the vulnerable carrier into the Fleet draws heavily upon the Fleet's protection.

As in the case of aircraft the champions of the aircraft carrier have made extravagant claims, painting a navy without battleships, battle cruisers and certain cruiser types, and with the aircraft carrier as the real capital ship. Her quota of fighting and bombing planes may well secure control of the air under certain conditions, but in view of the great vulnerability of the carriers to attack this claim seems worthy of no serious credence at this day.

If the weather in which a great sea-fight is staged is too stormy for the launching and operating of seaplanes it is plainly evident that a navy which placed its main dependence on its aircraft carriers, and eliminated its sturdy fighting ships, would be a helpless toy in battle against a force that placed its main reliance in battleships and cruisers. In the words of Secretary of the Navy Curtis D. Wilbur, "We cannot afford to rely upon a fair-weather fleet."

While the conversion of the *Lexington* and *Saratoga* was in progress the Navy carried out thorough tests on the converted carrier *Langley,* one-third their size. Through these tests were developed features that were incorporated into the two new carriers. There was the flight-deck that extends nearly 900 feet along the top of the vessel; the powerful catapults, operated by compressed air, which launch the

PLANES LAUNCHED BY CATAPULT

heaviest planes into the air at flying speed; the landing net to check the speed of planes flying aboard from astern; the powerful elevators that carry the planes to the flight-deck from the hangar-deck below; the cranes that hoist seaplanes aboard out of the water, and other striking details that have given our Navy two of the finest aircraft carriers afloat.

In both its airships and its aircraft carriers the Navy has strengthened its Fleet, and in all matters pertaining to an air fleet we have kept well abreast of modern developments. In the development of air bases, in the training of an increased number of officers and men for the naval air service the same foresight has been shown, and the aim to give the United States a well-balanced Navy that can fight on the surface, under the surface, and in the air, has gone ahead with true Navy determination and thoroughness.

RODMAN'S SQUADRON JOINS THE BRITISH GRAND FLEET

XXXIV

OUR NAVY IN THE WORLD WAR

WHEN the United States entered the World War on the side of the Allies in April, 1917, there was no prospect of victory for the allied forces until heavy American forces could turn the scale. The opposing armies were deadlocked and weary. The British Grand Fleet held command of the sea with the German High Seas Fleet bottled up in its bases, but the submarine menace was at its peak in April with 423 ships of 846,871 tonnage sunk in that month alone. The transport of troops and supplies overseas in the face of this underwater menace was the first great problem that faced the American Navy. Eighteen months later victory perched on the allied banners, and within that space of time the American Navy had gallantly solved that and other tremendous problems, and contributed heavily to the final success.

From painting by Gribble. U. S. Navy Official Photo

RESCUING DISABLED SEAPLANE IN THE WAR ZONE

THE NAVY'S FIRST U-BOAT CAPTURE

OUR DESTROYERS SCREENING MINE-LAYERS IN NORTH SEA

Our military and naval experts, at the beginning of this stirring period, knew that it would require a year and more before an adequate expeditionary army could be organized, equipped and landed on French soil. Yet, when the Armistice saw the end of the titanic conflict the Navy, along with its other work, had transported overseas 1,250,000 American soldiers without loss from action.

The transport of this great army to France; the convoying of supplies as well; the extermination of the submarines that were exacting a heavy toll of lives and shipping; the expansion of the Navy to practically eight times of its peace strength; the training and equipment of the raw material that rushed to the colors; the establishment of a powerful naval force in European Waters; these were some of the problems with which we had to cope in the face of tremendous difficulties. Other unforeseen tasks soon loomed up as the Navy began to forge ahead on its work.

Hand in hand went the two great tasks, the establishment of a formidable naval and aviation force in European Waters, and the

"THE NAVY PUT THEM ACROSS"

expansion of the fleet left in home waters into a huge training school for overseas work, the manning of armed merchantmen, the construction of new ships, and the development of a merchant marine.

SETTING THE DEADLY DEPTH CHARGE

First of the problems that we faced was the submarine menace, and it was met with traditional skill and determination. The experts assigned to that problem decided to meet it by establishing a gigantic mine barrage that would seal up the German coast. First they had to convince a sceptical British Admiralty of its feasibility. The next steps were to devise an entirely new type of mine, manufacture and transport them overseas in huge numbers, and then lay them in the North Sea with its notoriously stormy weather, floating mines and prowling enemy submarines.

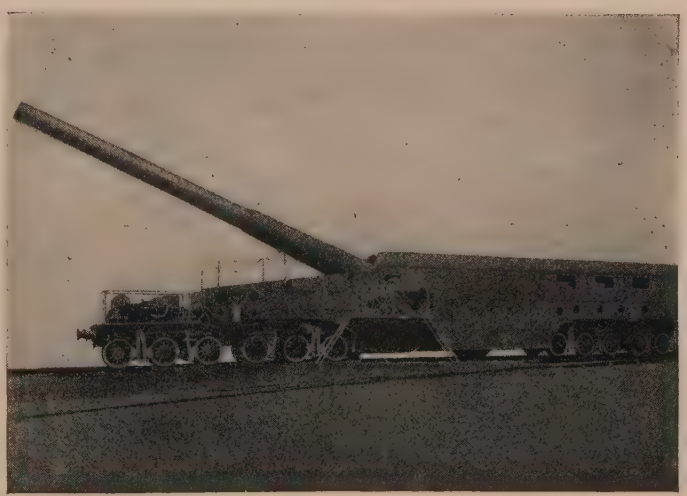
Out of nothing a splendid squadron of ten mine-layers was created. Under terrific handicaps the work went on and in June, 1918, the first mines were laid. With both floating and anchored mines, operating from 35 to 200 feet below the surface, the barrage was laid between the Orkney Islands and Norway. At these depths passage was safe for surface vessels, but the mines effectively barred the passage of a submerged submarine, leaving patrols to

MARINES ON CRUISER IN SIBERIAN WATERS

fight it when it was forced to run on the surface.

DESTROYER IN THE NORTH SEA

With the help of the British this dangerous work was carried on until, when the Armistice arrived, a barrage of 73,060 mines faced the German submarines. Of this number our Mine Force laid 56,760, or 80 percent of the great Northern Mine Barrage. At the height of this work our seamen, within four hours' time, laid a greater number of mines than the American Navy owned before the Mine Force was organized. In stormy weather, with ghastly casualties marring the work at its beginning, this task was prosecuted. It is estimated that approximately 23 German submarines met their fate in the minefield. German submarine officers, after the war, testified that the mere threat of this death-strewn area had forced their craft to the surface, there to run the gauntlet of the sea-patrols. That it brought the morale of the German Navy to its lowest ebb is certain, for just prior to the Armistice a serious mutiny broke out in it.



THE NAVY'S 14-INCH GUNS WERE THE LARGEST ON WESTERN FRONT

The organization perfected overseas, which made just such a feat as the Northern Mine Barrage possible, was a triumph for American tenacity and

our naval traditions. Practically simultaneous with the conversion of the home base at Yorktown, Virginia, into a mammoth training school, this organization was built up. Beginning with the despatch of Vice Admiral William S. Sims to London to confer with the Allied Naval Mission, the end of the Armistice found a great force in European Waters that compelled, through its smooth efficiency, the admiration of the allied navies.

The supreme head of this organization was Admiral Henry T. Mayo, Commander-in-Chief of the greatest fleet that ever flew the American flag His command, however, not only covered all our activities in the war zone, but command also of the great force that was being built up in home waters.

TORPEDOED TRANSPORT "MT. VERNON" IN FRENCH DRYDOCK

AT THE QUEENSTOWN BASE

THE MINES OF THE NORTHERN BARRAGE

Under him served a notable group of Admirals. At London was Vice Admiral Sims, who, as part of Mayo's command was Commander of the American Naval Forces in European Waters. At Brest, France, was Vice Admiral Henry B. Wilson, in command of our forces in French Waters. Two divisions of our most powerful battleships operated under the control of Admiral Mayo as a part of the British Grand Fleet. Rear Admiral Hugh Rodman commanded the division assigned to the position of fast wing as the Sixth Battleship Squadron of the Grand Fleet, and Rear Admiral Thomas S. Rogers the division stationed at Bantry Bay, Ireland. At this time the German High Seas Fleet was bottled up in the bases to which it had retreated after the Battle of Jutland, but the threat of another major action at sea, or of a disastrous raid by the speedy and powerful German battle cruisers was no idle threat. Neither of these splendid American units was given the chance to show its worth in actual battle, but they were a powerful aid to the retention of the control of the sea that Admiral Jellicoe strengthened at Jutland.

From painting by Gribble. U. S. Navy Official Photo

THE DESTROYERS WERE FIRST IN THE WAR ZONE

Rodman's ships were present at the final surrender of the German High Seas Fleet at the Firth of Forth. When the *George Washington,* carrying President Wilson to France after the Armistice, steamed into the French harbor at Brest, on December 13, 1918, the *Pennsylvania,* flying the four-starred flag of Admiral Mayo, led the formidable escort of which Rear Admiral Rodman's gallant force was a part.

A picture of the magnitude of our work overseas may be gained from the fact that, when the Armistice ended hostilities, the officers and men on duty in European Waters numbered 80,565 or more than the entire strength of the Navy when war began. American battleships were in the line of battle on the North Sea. American minelayers were operating magnificiently in that turbulent stretch of water. Destroyers were patroling, convoying and doing their gallant bit on the coasts of France, England, Ireland and the Mediterranean. Other ships were operating off the Azores, Gibraltar and in the Adriatic. A lone cruiser was stationed in Northern Russia. Our fleet of colliers was steaming over the dangerous stretch from Wales to France. Our naval and marine birdmen were bombing German points and hunting down the elusive submarine from their French, English and

SUBMARINE TENDER AT AN IRISH BASE

Italian bases. Naval railway batteries were pounding strategic points far behind the German lines on the Western Front, and in that same sector a brigade of marines saw notable action.

FLIERS OF THE NORTHERN BOMBING GROUP

No story of those operations would be complete without reference to the three great American naval bases at Queenstown, Brest and Gibraltar. In order that the hundreds of vessels passing through those danger zones could cruise in safety these three major bases were selected. These bases furnished repair facilities and supplies for the great armada of destroyers, cruisers, transports, armed yachts and transports that were flying our colors. The convoy of troop and supply ships, the patrol of the waters where submarines lurked, and battles with enemy submarines could not have been efficiently carried on without these complete bases. The destroyers based on Queenstown alone, operating in all kinds of weather, ready for any call, escorted one-sixth of the shipping of the high seas in the months of July and August without a single loss, and furnished protection for our cruising battleships.

A CAMOUFLAGED TRANSPORT

Off Brest a miniature fleet of armed yachts, reënforced later by destroyers, performed the duty of both deep-sea and coastal convoys with equal distinction, and under

hazardous conditions. In the months of 1918 these combined craft escorted 91 percent of all the convoys entering or leaving France. Four days out of six, as at the other major bases, the destroyers were at sea, and life on a destroyer in a war-zone is duty that calls for the highest courage and fortitude.

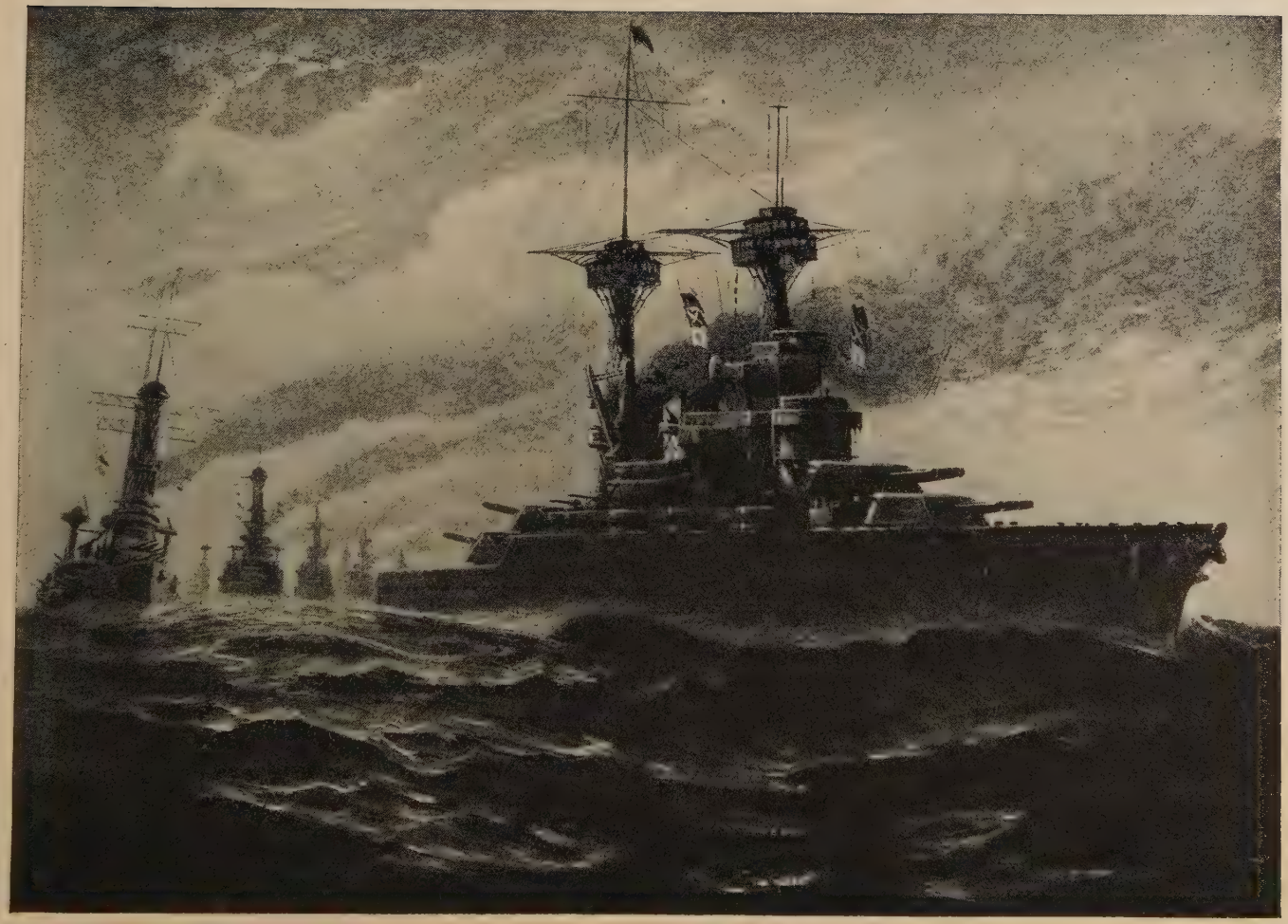
NAVAL RAILWAY BATTERY POUNDING THE GERMAN LINES

At the Gibraltar base, gate to the Mediterranean, was gathered a more miscellaneous force, ranging from cruisers to yachts, busy in the convoy of merchant vessels between Gibraltar and England, between points in the Mediterranean, and the large convoys of merchantmen bound to and from the United States and South American points. This base supplied 25 percent of the escorts for the local Mediterranean convoys and 75 percent of the escorts of the allies for the ocean and deep-sea convoys.

Not until these bases, with their convoy escorts and their patrols had been established, could it be said that the United States Navy was throwing its weight into the conflict.

It would be difficult indeed to overestimate the efficiency and heroism of the Cruiser and Transport Service that was organized to operate from our important bases. It contributed its full measure to the ultimate objective of the war, the crush-

MARINES PRACTICING GRENADE THROWING WITH FRENCH CHASSEURS



READY FOR ACTION WITH THE GERMAN FLEET

CONVOYING PRESIDENT WILSON TO FRANCE ON THE "GEORGE WASHINGTON"

ing of an arrogant enemy. Commanded by Vice Admiral Albert R. Gleaves, this force of cruisers, destroyers, armed yachts, naval transports and other anti-submarine craft made a splendid record. The cruisers and transports alone carried overseas practically half of the American Army.

A MINE SWEEPER IN THE NORTH SEA

It performed its duty in the war-zone under the most trying conditions. It combatted the submarine menace in fog, storm and fair weather alike. At night it was forced to steam without lights on a black sea and, with the greater part of its convoy crews inexperienced, a manouver in the convoy formation was always attended by an added risk of collision.

When the Armistice was signed the Cruiser and Transport Service numbered 24 cruisers and 42 transports alone, with a personnel of 45,000. As an index of its risks it should be remembered that it suffered more than one-half of the war casualties of the American Navy. It carried overseas, irrespective of other craft engaged in the same duty, 44 percent of the American Army, and brought back 87 percent of our armed forces.

Most notable of the work performed by still another separate force, the aviators, was that of the Northern Bombing Group. Night and day squadrons in the Calais-Dunkirk area continuously bombed the enemy submarine bases on the Belgian coast or military objectives behind the German lines. Our aviation force over-seas, working with the British, dropped a total of 80 tons of deadly bombs on both naval and military objectives, and delivered a total of 39 attacks on enemy submarines.

First of all the American aviation units to land in Europe was a naval aviation unit. In the face of disheartening obstacles, and starting with the proverbial "shoestring" in trained personnel, planes and

bases, the sea-going fliers, both naval and marine, showed a fine spirit of self-sacrifice and determination. Great air bases were established in England, Ireland and France. From Killingholme, on the eastern coast of England, an aerial patrol of the North Sea was carried on by seaplanes and blimps, and within 25 miles of land the detection of submarines by the aerial escort working with convoys proved even more effective than that done by surface craft.

One of the most picturesque forces that fought on the Western Front was a contribution of the Navy. Under command of Rear Admiral Charles P. Plunkett five naval railway batteries were organized, equipped, transported to France, and joined the Allies in their great drive in the summer and fall of 1918. Each battery consisted of a powerful locomotive and fifteen cars, and on the gun car was mounted the Navy's most effective weapon, the 14-inch naval gun. This gun ranged more than 20 miles and fired an armor-piercing shell that weighed 1,400 pounds.

Through practically every famous battle-field of that front these batteries traveled and spread consternation behind the German lines. They were the most powerful artillery group used at the front by the Allies and did magnificent duty, and that not without casualties among the crews. Their principal targets were important railway centers and railway freight yards along the German lines of communication. The great bulk of their firing was not directed by plane or balloon observation, as in the case of the land batteries, but by intelligent use of the French maps, requiring skill of the highest order.

Most deadly of all their work was the cutting of the German railway line running through Montmedy and Longuyon on the Meuse-Argonne front. Through the destruction of this line, one of the most important on

THE FLAGSHIP OF THE MINE FORCE

the whole German front, the enemy was forced to forward troops and supplies to the important point of Sedan by a tremendous detour. The moral effect of these great guns alone was of inestimable service to the Allies. One shell struck a motion picture house far behind the lines, which was packed with German soldiers. That shell killed 40 and seriously wounded twice that number. The batteries fired a total of 646 rounds and the last shell fired left its gun exactly one minute before the Armistice put an end to hostilities.

While the work of the Navy in the war-zone was by far more spectacular its work in home waters should not be slighted. In its expansion from a small regular force of 69,046 officers and men to the huge total of 34,292 officers and 503,742 enlisted and enrolled at the end of the war it confronted a task far greater than any of its allies. The training of inexperienced officers and men to effect this expansion was in itself a remarkable feat. In the sheltered waters of Yorktown harbor, and at shore bases from coast to coast and on the Great Lakes, officers and men worked like Trojans. The raw recruits on battleships and cruisers, in barracks and shops, had to be put through a hard, short course to fit them for active duty with the Fleet and its Train, for the armed merchantmen and the great construction program. Schools also had to be established to train officers and men for the fast-growing merchant marine. The recruiting machinery

THE OVERSEAS DREADNOUGHTS BACK IN HOME WATERS

alone was a formidable force, and the supply of men and ships a gigantic task.

At the foreign bases of Queenstown and Brest the destroyer forces ably supplemented the training program. At these two bases a total of 674 officers and 10,315 men were received for training on the destroyer squadrons. Back to the home fleet 260 officers and 2,404 trained men were sent as a nucleus for new destroyers destined for service in the war zone. In the midst of actual operations against the enemy this training was carried on.

Not content with its valuable contribution to the allied cause the Navy, following the Armistice, volunteered to perform a task that was fraught with all the hazards of war. Having laid 80 percent of the mine barrage in the North Sea, it seemed fitting that the Navy should remove that menace. Aside from the danger to shipping in that actual area, there was the peril of mines breaking adrift from their moorings, and being swept hundreds of miles by wind and currents. To sweep these waters, with their 73,000 mines armed with the most sensitive firing devices, was a prospect warranted to daunt the most courageous and inventive seamen. There is no more dangerous stretch of waters than the North Sea with its heavy fogs and frequent gales. Added to this was the danger of the mines.

Rear Admiral Joseph Strauss, who had commanded the mine-laying operations, was selected for this even more difficult feat. Handicaps, delays, the long series of dangerous experiments to determine the most effective method, the equipping and organization of specially-selected mine-sweepers, and a heavy toll of sunken ships and casualties were one by one met and mastered by the magnificent spirit of the officers and men who volunteered for this most hazardous duty.

The method finally adopted was a most ingenious one. Two mine-sweepers, steaming 750 yards apart, went over the mine-fields. Between them they towed an electrically charged wire sweep, regulated to sweep at a depth that would cut the antennas and explode the mines. Behind them steamed a second pair of mine-sweepers, their wire sweep set to cut the mooring cables of any mines not exploded by the leading pair. Behind them came a jaunty sub-chaser to sink with rifle fire any mines that reached the surface intact.

Within the space of five months the Mine Sweeping Force completed its work, and naval history has never recorded a more striking feat. In the Mediterranean, with the French naval station of

Bizerta on the North African coast as its base, similar work rid the Mediterranean of its menacing mines.

On Christmas Day of 1918, Rear Admiral Rodman's division, fresh from the great war zone, dropped anchor off Ambrose Light. The following day the combined Fleet, with Admiral Mayo leading on the *Pennsylvania,* steamed majestically up the North River to New York. Off the Statue of Liberty, the Secretary of the Navy, Josephus Daniels, reviewed that gallant force as it steamed past the *Mayflower,* the President's yacht, to its tumultous welcome by the American people.

Such is the story of the marvelous expansion and performance of the United States Navy in the World War. When the glories of the American Expeditionary Force are sung the proud boast of the Navy should not be forgotten.

"The Navy put them over!"

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